

Six-Phase Heating™ Pilot-Scale Test

Technology Performance Report

Dense Non-Aqueous Phase Liquid
Eastern Parking Lot Groundwater Plume

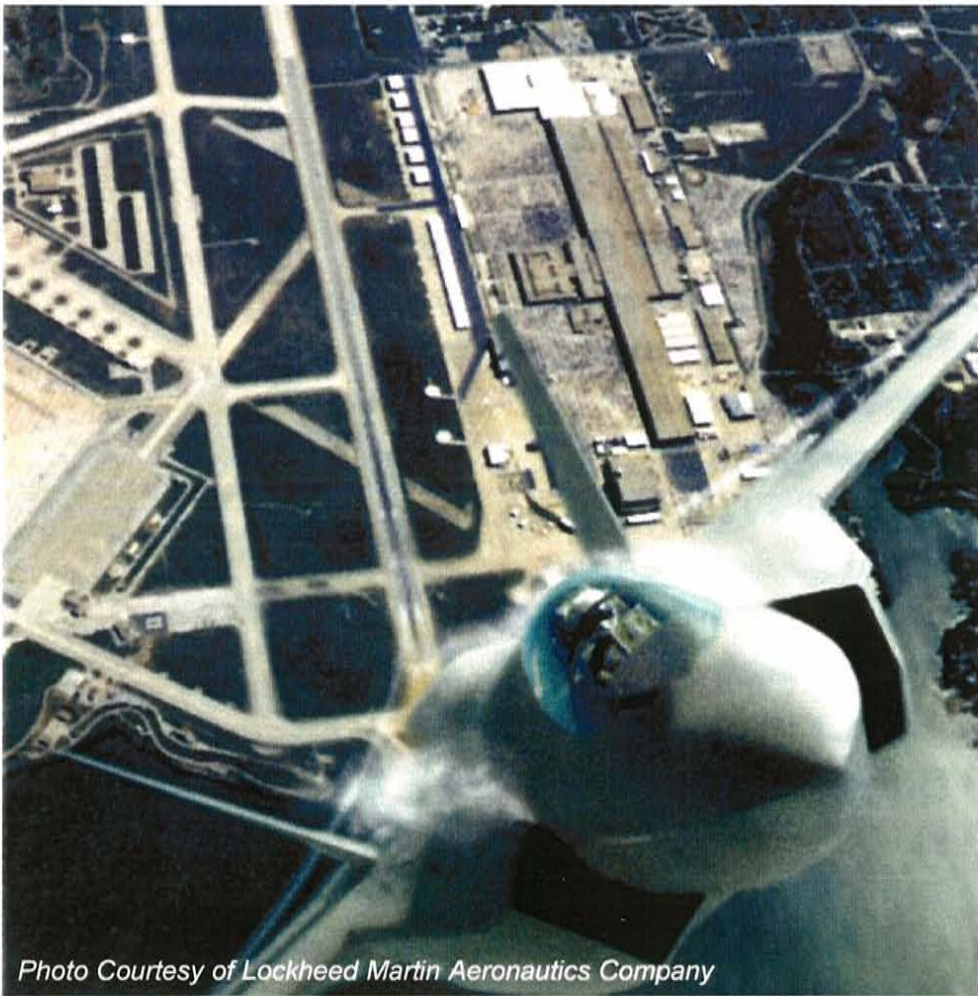


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Air Force Plant 4
Fort Worth, Texas
May 2001



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SIX-PHASE HEATINGTM PILOT-SCALE TEST

FINAL

TECHNOLOGY PERFORMANCE REPORT

DENSE NON-AQUEOUS PHASE LIQUID EASTERN PARKING LOT GROUNDWATER PLUME AIR FORCE PLANT 4 FORT WORTH, TEXAS

Contract Number F41624-97-D-8020

Prepared for

Air Force Center for Environmental Excellence
Brooks AFB, Texas

Aeronautical Systems Center
Wright-Patterson AFB, Ohio

Prepared by

URS Corporation
Austin, Texas

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| 13. ABSTRACT <i>(Maximum 200 words)</i> This document presents the Technology Demonstration Report for a Six-Phase Heating™ (SPH) Pilot-Scale Test at Air Force Plant 4, Fort Worth, Texas. The test was performed to determine the effectiveness of SPH at removing volatile organic compounds, primarily trichloroethene (TCE), from the vadose and saturated zones underlying Building 181. | | | |
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PREFACE

URS Corporation (formerly Radian International, LLC) was contracted on July 1999 to perform a Pilot-Scale Study and Remedial Design for the Remediation of the Dense Non-Aqueous Phase Liquid (DNAPL) in the Eastern Parking Lot (EPL) Groundwater Plume at Air Force Plant 4, Fort Worth, Texas. Work is being conducted under Contract Number F41624-97-D-8020, Delivery Order Number 0109.

Key URS personnel are as follows:

| | |
|----------------------|-------------------------------|
| Eric McLaurin | Contract Manager |
| Stephen Fain, P.G. | Project Manager |
| Craig Holloway, P.E. | Task Manager/Project Engineer |
| Eric Anderson | Health and Safety Officer |
| Jean Youngerman | QA/QC Coordinator |

The anticipated period of performance for this delivery order is from July 1999 to October 2001. This contract is administered by Ms. Sarah J. Byrum, U.S. Air Force, Headquarters Human Systems Center, located at 3207 North Road, Brooks AFB, TX 78235-5363. The Contracting Officer's Representative (COR) is Mr. Don Ficklen (210/536-5290) located at HQ AFCEE/ERD, 3207 North Road, Brooks AFB, Texas 78235-5356.

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Table of Contents

| | Page No. |
|---|----------|
| Executive Summary | ES-1 |
| 1.0 Introduction | 1-1 |
| 1.1 Site Description and Operational History | 1-1 |
| 1.2 Previous Investigations, Studies, and Remedial Actions..... | 1-3 |
| 1.3 Record of Decision Requirements | 1-4 |
| 1.4 Purpose and Objectives..... | 1-6 |
| 1.5 Technology Description..... | 1-10 |
| 1.5.1 AFP4 Application | 1-11 |
| 1.6 Summary of Field Activities | 1-13 |
| 2.0 Site and Operating Conditions | 2-1 |
| 2.1 Pilot Study Location and Features | 2-1 |
| 2.2 Geology | 2-2 |
| 2.3 Hydrogeology | 2-5 |
| 2.4 Conceptual Site Model..... | 2-6 |
| 2.5 Contaminant Properties..... | 2-9 |
| 2.6 Pilot Test Matrix Characteristics and Design Parameters | 2-13 |
| 2.7 Indoor Air Monitoring | 2-13 |
| 2.8 Subsurface Pressure Condition | 2-15 |
| 3.0 Summary of Events | 3-1 |
| 3.1 Chronology of Events | 3-1 |
| 3.2 Significant Events and System Modifications During Operation..... | 3-1 |
| 3.2.1 Monitoring Well Voltage..... | 3-3 |
| 3.2.2 Vapor Treatment System | 3-3 |
| 3.2.3 Transfer Pump..... | 3-3 |
| 3.2.4 Electrical Curtailment | 3-4 |
| 3.2.5 Electrodes..... | 3-4 |
| 3.2.6 SPH Power Supply..... | 3-4 |
| 3.3 Systems Measurements | 3-5 |
| 3.4 Quality Control/Quality Assurance | 3-5 |
| 4.0 Project Schedule and Management | 4-1 |
| 4.1 Subsurface Temperatures Results | 4-1 |
| 4.1.1 Subsurface Temperature versus Depth | 4-1 |
| 4.1.2 Subsurface Temperature versus Time..... | 4-2 |
| 4.2 Groundwater Results..... | 4-8 |
| 4.3 Soil Results | 4-11 |

Table of Contents

| | Page No. |
|---|------------|
| 4.4 Overall Removal Efficiency | 4-11 |
| 4.4.1 Enhanced Degradation | 4-17 |
| 4.4.2 Helium Tracer Test Results | 4-18 |
| 5.0 Cost Summary | 5-1 |
| 6.0 Conclusions and Recommendations | 6-1 |
| 6.1 Conclusions..... | 6-1 |
| 6.2 Recommendations..... | 6-3 |
| 7.0 Lessons Learned..... | 7-1 |
| 8.0 References | 8-1 |
| Appendix A: Lithologic and Completion Logs | |
| Appendix B: State of Texas Well Reports | |
| Appendix C: Corrosion Potential Memorandum | |
| Appendix D: Analytical Data | |
| Appendix E: Laboratory Audit Report | |
| Appendix F: SPH Site Log | |
| Appendix G: Helium Tracer Test Memorandum | |

List of Tables

| | Page No. |
|--|----------|
| 1-1 SPH Pilot-Scale Test Objectives..... | 1-9 |
| 1-2 SPH Statistical Evaluation Criteria..... | 1-9 |
| 1-3 SPH Field Activities Summary | 1-14 |
| 2-1 Select TCE Properties | 2-9 |
| 2-2 SPH Test Area TCE Concentrations by Depth | 2-10 |
| 2-3 SPH Test Area Matrix Characteristics | 2-13 |
| 2-4 SPH Pilot Test Design Parameters..... | 2-14 |
| 3-1 SPH Sample and Measurement Location and Frequency | 3-6 |
| 3-2 SPH Detailed Analytical Sampling Schedule ⁽¹⁾ | 3-7 |
| 4-1 AFP4 SPH Groundwater Sampling Results..... | 4-9 |
| 4-2 SPH Groundwater Statistical Evaluation Results | 4-9 |
| 4-3 AFP4 SPH Soil Sampling Results | 4-12 |
| 4-4 SPH Soil Statistical Evaluation Results..... | 4-12 |
| 4-5 Concentration of TCE in Condensate Samples..... | 4-14 |
| 4-6 SPH Power, Vapor and Condensate Summary | 4-15 |
| 4-7 Helium Tracer Recovery Test Results Summary..... | 4-19 |
| 5-1 AFP4 SPH Pilot Test Cost Summary..... | 5-2 |

List of Figures

| | Page No. |
|---|----------|
| 1-1 Site Location Map..... | 1-2 |
| 1-2 East Parking Lot and Building 181 Areas of Soil and Groundwater Contamination Distribution | 1-7 |
| 1-3 Representation of SPH Electrical Current Distribution..... | 1-10 |
| 1-4 Photograph of Test During Operation | 1-11 |
| 1-5 SPH Process Flow Diagram..... | 1-12 |
| 1-6 Detailed SPH Test Area | 1-15 |
| 2-1 AFP4 SPH Site Plan..... | 2-3 |
| 2-2 SPH Area Conceptual Site Model | 2-7 |
| 2-3 Hydrogeology and Contaminant Distribution along Cross-Section A-A' | 2-11 |
| 2-4 Hydrogeology and Contaminant Distribution along Cross-Section B-B' | 2-12 |
| 2-5 SPH Average Vapor Recovery Flow Rate versus Temperature | 2-17 |
| 3-1 SPH Pilot Test Timeline | 3-2 |
| 4-1 SPH Temperature vs. Depth Plots | 4-3 |
| 4-2 SPH temperature vs. Time Plots | 4-5 |
| 4-3 SPH Average Temperature vs. Depth and Time..... | 4-7 |
| 4-4 TCE Concentrations in Groundwater | 4-10 |
| 4-5 TCE Concentrations in Soil | 4-13 |
| 4-6 SPH TCE Extraction Rate, Condensate Production, and Subsurface Temperatures..... | 4-16 |

List of Acronyms, Abbreviations, and Symbols

| | |
|-----------------|---|
| % | percent |
| < | less than |
| > | greater than |
| ° C | degrees Centigrade |
| µg | microgram |
| AC | alternating current |
| AFCEE | Air Force Center for Environmental Excellence |
| AFP4 | Air Force Plant 4 |
| ARAR | applicable or relevant and appropriate requirements |
| ASC | Aeronautical Systems Center |
| bgs | below ground surface |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund) |
| cm | centimeter |
| CPVC | chlorinated PVC |
| DNAPL | dense non-aqueous phase liquid |
| DoD | United States Department of Defense |
| DTT | DNAPL Tracer Test |
| EPA | United States Environmental Protection Agency |
| EPL | Eastern Parking Lot |
| ft | feet |
| ft ³ | cubic feet |
| GC | gas chromatograph |
| gpm | gallons per minute |
| HSP | Health and Safety Plan |
| K | hydraulic conductivity |
| kg | kilogram |
| kW | kilowatt |
| L | litre |

List of Acronyms, Abbreviations, and Symbols (Continued)

| | |
|---------------|--|
| LM Aero | Lockheed Martin Aeronautics Company |
| lb | pound |
| mg | milligram |
| MHz | megahertz |
| mm Hg | millimeters of mercury |
| NAS | Naval Air Station |
| NAS-JRB | Naval Air Station Joint Reserve Base |
| NPL | National Priorities List |
| O&M | operations and maintenance |
| P&T | pump-and-treat |
| PID | photoionization detector |
| POTW | publicly owned treatment works |
| PTRG | Pilot Test Remediation Goal |
| PVC | polyvinyl chloride |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| SAP | Sampling and Analysis Plan |
| sec | second |
| SPH | Six-Phase Heating TM |
| SVE | soil vapor extraction |
| T | transmissivity |
| TCE | trichloroethene |
| TM | Trade Mark |
| TNRCC | Texas Natural Resource Conservation Commission |
| TOC | total organic content |
| VOC | volatile organic compound |

EXECUTIVE SUMMARY

This Technology Performance Report contains evaluation of the effectiveness of Six-Phase Heating™ (SPH) technology at removing trichloroethene (TCE), including reported dense non-aqueous phase liquid (DNAPL), at the Air Force Plant 4 (AFP4), Fort Worth, Texas site. Based on prior results of an evaluation of thermal technologies, to enhance contaminant recovery over that obtained with the existing soil vapor extraction (SVE) system at the site, in-situ electrical resistive heating was selected as the thermal enhancement for the pilot-scale testing. AFP4 is an operating facility, and the test was performed in such a way as to minimize disruptions to Lockheed Martin Aeronautics Company's (LM Aero) manufacturing mission. URS Corporation (URS) and Current Environmental Solutions (CES) jointly performed the planning, pilot-scale testing, and reporting for the USAF Aeronautical Systems Center (ASC) and the Air Force Center for Environmental Excellence (AFCEE).

SPH uses conventional single-phase transformers to convert standard three-phase electricity into six-phase electricity. For the pilot-scale test, seven electrodes were inserted into the ground in a hexagonal array (one neutral electrode in the center of the array), with six perimeter electrodes located 60 degrees apart both physically and electrically and each receiving a separate current phase. The hexagonal-shape electrode array appears to provide a more uniform distribution of electrical currents in the subsurface than other geometric layouts. Each electrode conducts electricity with as many as six other nearby electrodes. In addition to flowing along the straight-line path between the electrodes, the current also fans out slightly in the vertical and horizontal directions. The result of this electrical current is even heat generation in the subsurface that leads to uniform steam production and volatile organic compound (VOC) volatilization throughout the treatment volume.

The pilot-scale test was performed within the source area for the Eastern Parking Lot (EPL) TCE groundwater plume at the site. The original source of TCE is believed to be leaking degreaser tanks in Building 181, the Chemical Process Facility, that have since been removed. The degreaser tanks were removed from service in 1991, after reported leaks of over 20,000 gallons of TCE. Results of several subsequent investigations found that the releases of TCE had resulted in contamination of the vadose zone and groundwater beneath Building 181. The resulting groundwater contamination is moving in a generally northeastern direction, to underneath the EPL area.

SPH pilot-scale test field activities were conducted over an eight-month period beginning with the drilling and installation of subsurface components on 17 April 2000 and ending with the post-test soil sampling on 21 November 2000. Implementation of the SPH pilot study followed strict adherence to the *Six-Phase Heating™ Pilot-Scale Test Work Plan, Sampling and Analysis Plan, and Health and Safety Plan* (URS and CES, March 2000). Subsurface heating activities were completed over a 13-week time period from 7 August through 3 November 2000.

The subsurface in the test area beneath Building 181 consists of heterogeneous alluvium materials with varying amounts of clayey sand, sandy clay, and gravelly clay; and a deeper saturated silty or clayey sand and gravel unit that immediately overlies limestone and/or shale bedrock. The test area vadose zone is approximately 25–30 ft thick, and it transitions into a thin aquifer that is typically less than 5 ft thick.

The SPH test was designed to treat a circular area of 3,120 ft² (heated area, assuming 45 ft diameter array and heating zone extending 1.4 x array diameter), and a volume of 3,930 yd³ (from 2.5 to 37 ft below ground surface). The pre-test determined average dissolved-phase TCE concentration in the saturated zone was 141 mg/L, and TCE concentrations in the vadose zone have ranged from < 1 to > 2700 mg/kg. Table ES-1 shows the three primary performance objectives for the SPH test.

Table ES-1
SPH Pilot-Scale Test Objectives

| Performance Criteria | Performance Objective | Method of Measuring Performance |
|---|-------------------------------|--|
| Subsurface temperatures in the treatment volume | Boiling point of TCE at depth | Subsurface temperature monitoring points |
| Soil TCE pilot test remediation goal | <11.5 mg/kg ¹ | Pre- and post-test borehole soil sampling |
| Groundwater TCE pilot test remediation goal | < 10 mg/L ¹ | Pre-test, interim and post-test groundwater sampling |

¹ These performance objectives represent a >99% and >96% reduction in soil and groundwater TCE concentrations, respectively, from the highest previous detections in the SPH test area.

Overall, the SPH pilot-scale test proved successful in heating the subsurface and removing TCE contaminants from the soil and groundwater at the site. The following points summarize the major results of the test.

- ▶ SPH raised the subsurface temperature above the boiling point of TCE at 21 of 24 monitoring locations. At 14 of 24 monitoring locations, subsurface temperatures reached the boiling point of water.
- ▶ Based on the statistical evaluation criteria to assess test performance, involving both upper confidence limit (UCL) and means comparisons, SPH was effective at remediating the soil and groundwater.
- ▶ Pre- and post-test soil sampling results showed that although only one of the 15 pre-test soil samples had a TCE concentration (18.3 mg/kg) > the 11.5 mg/kg groundwater protection threshold, it was reduced to < 1 mg/kg by the heating. The soil mean concentrations fell from 3.4 to 0.16 mg/kg, yielding a 95% reduction. The 95% UCL concentration was reduced from 8.4 to 0.29 mg/kg, yielding a 97% reduction.
- ▶ SPH reduced TCE concentrations in the groundwater to below the 10 mg/L performance objective. The groundwater mean concentration fell from 73.4 to 3.6 mg/L, yielding a 95% reduction. The 95% UCL concentration was reduced from 129 to 5.7 mg/L, yielding a 96% reduction. Only one of 10 wells did not experience TCE reductions to below the objective.
- ▶ Approximately 330 pounds of TCE were removed from the subsurface during the pilot test. Most of this was in the vapor phase, with less than one pound being removed as condensate.
- ▶ The chloride measurements in groundwater indicate that biodegradation of TCE was enhanced by the heating resulting from SPH. This biodegradation probably consisted of reductive dehalogenation or halorespiration and contributed significantly to the reduction of TCE concentrations.
- ▶ The cost of remediating the subsurface with SPH is approximately \$1,500/lb of TCE removed, or \$130/cubic yard, notwithstanding soil vapor treatment costs.
- ▶ The system was able to input the required energy at an acceptable level and rate, and no unsafe operating voltage potentials were established during the test.
- ▶ Continuous monitoring of air quality within the building showed no measurable deterioration as a result of the remediation.
- ▶ Helium tracer recovery test and indoor air monitoring data indicate the SVE system was effective at capturing vapors generated from the heating.

- ▶ Average subsurface vapor flow and recovery appeared to increase with increased temperatures.
- ▶ Technology related safety data (e.g., induced voltages, air quality) and a pipe corrosion analysis indicate larger-scale SPH implementation could be performed within the building without unacceptable impact on plant operations.
- ▶ The existing treatment system adjacent to Building 181 appears adequate for a larger-scale implementation of SPH technology.
- ▶ Accordingly, data gathered during the pilot-scale test support the design and implementation of larger-scale SPH application at AFP4.

Based on the findings of the pilot-scale test, some of the recommendations for any future, presumably larger-scale implementation of SPH at AFP4 include: 1) collecting additional groundwater, and possibly soil gas, samples to further assess rebound potential; 2) decreasing the diameter of the electrode array; 3) heating to a shallower depth below the building slab; 4) evaluating methods other than traditional soil sampling to assess remediation of the vadose zone; 5) having additional spare parts for SPH and the existing treatment system; 6) further delineating the extent of soil contamination to the north of the test array prior to, or concurrently with, larger-scale implementation; 7) evaluating the possibility of TCE DNAPL residing in the underlying limestone; and 8) ensuring groundwater monitoring wells used to measure technology performance are screened to the underlying bedrock interface.

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SIX-PHASE HEATING™ PILOT-SCALE TEST
TECHNOLOGY PERFORMANCE REPORT
DENSE NON-AQUEOUS PHASE LIQUID
EASTERN PARKING LOT GROUNDWATER PLUME
AIR FORCE PLANT 4
FORT WORTH, TEXAS

1.0 INTRODUCTION

URS Corporation (formerly Radian International) and Current Environmental Solutions (CES) have jointly prepared this Technology Performance Report for the USAF Aeronautical Systems Center (ASC) and the Air Force Center for Environmental Excellence (AFCEE). This report contains evaluation of the effectiveness of Six-Phase Heating™ (SPH) technology at removing trichloroethene (TCE), including reported dense non-aqueous phase liquid (DNAPL), at the Air Force Plant 4 (AFP4), Fort Worth, Texas site. The TCE DNAPL is believed to be the source of the Eastern Parking Lot (EPL) groundwater plume at the site.

Selection of the SPH technology for this test is documented in the *Preliminary (30%) Remedial Design, Dense Non-Aqueous Phase Liquid, Eastern Parking Lot Plume, Air Force Plant 4, Fort Worth, Texas* (Radian, September 1999). The test was conducted according to the *Six-Phase Heating™ Pilot Scale Test Work Plan, Sampling and Analysis Plan, and Health and Safety Plan, Dense Non-Aqueous Phase Liquid, Eastern Parking Lot Groundwater Plume, Air Force Plant 4, Fort Worth, Texas* (Radian & CES, March 2000).

1.1 Site Description and Operational History

AFP4 is located in Tarrant County, Texas, seven miles northwest of the City of Fort Worth (see Figure 1-1). The plant is bounded by Lake Worth on the north, Naval Air Station Fort Worth Joint Reserve Base on the east, the community of White Settlement on the south and west, and the City of Fort Worth on the west. The facility occupies 602 acres.

AFP4 is an active military aircraft manufacturing facility currently being operated by Lockheed Martin Aeronautics Company (LM Aero). Past management of

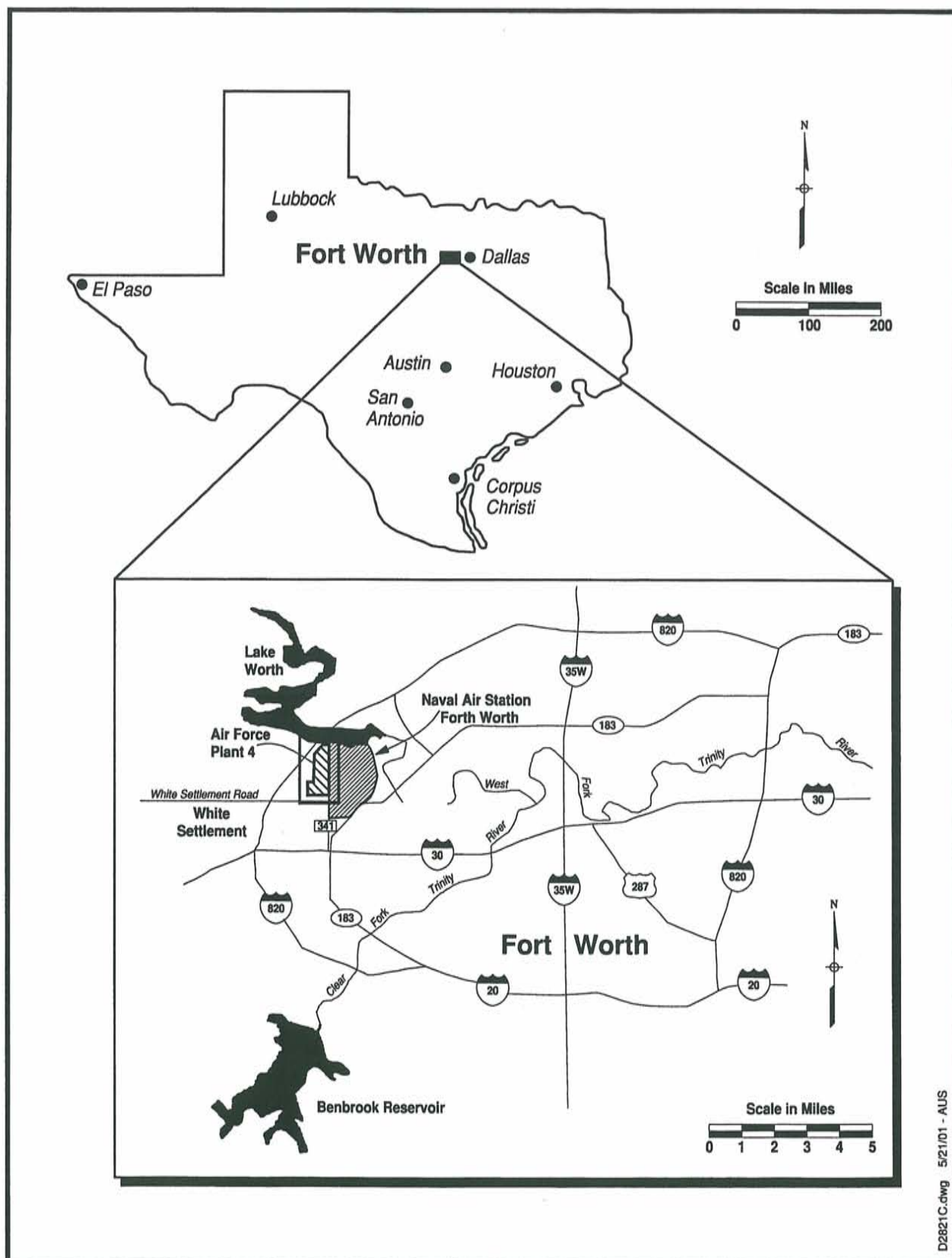


Figure 1-1. Site Location Map

waste oil, solvents, and fuels generated during the manufacturing operations have resulted in over 31 separate sites of investigation, including landfills, fire training areas, underground storage tanks, and other miscellaneous areas.

The pilot-scale test documented in this report addresses a portion of the source area associated with one of these sites of investigation – the EPL groundwater plume. The origin of the TCE source material is believed to be degreaser tanks in Building 181 that have since been removed. Building 181, the Chemical Process Facility, is part of the Assembly Building/Parts Plant. In May 1991, a TCE vapor degreaser tank in Building 181 was discovered to be leaking. The documented TCE release from tank T-534 was an estimated 20,000 gallons. On 15 June 1991, tanks T-544 and T-534 were removed from service.

Based on several subsequent investigations it was found that releases of TCE had resulted in contamination in the vadose zone, including Terrace Alluvium and overlying fill soil under Building 181. Accurate information is not available on the total amount of TCE that had spilled or leaked from the tanks, how much TCE is in the vadose zone, or how much TCE is in the Terrace Alluvial groundwater (Rust Geotech, 1996). The contaminated vadose zone beneath Building 181 is thought to be a source of contamination to Terrace Alluvial groundwater, with flows in a northeast direction under Building 181 and the EPL. Contaminant transport is contained in the EPL by a series of groundwater extraction wells.

1.2 Previous Investigations, Studies, and Remedial Actions

Contamination at AFP4 was initially identified in 1982. The site was placed on the National Priorities List (NPL) in August 1990. Numerous activities have been performed at Building 181 and the EPL plume, with key documents related to these areas listed below in chronological order.

- ▶ Remedial Investigation (RI) (Rust Geotech, 1995a). This document summarizes the results of the site investigations to date for numerous sites at AFP4, and includes information on field investigations, nature and extent of contamination, contaminant fate and transport, and potential risk to human health and the environment.

- ▶ Feasibility Study (FS) (Rust Geotech, 1995b). This document develops and evaluates remedial alternatives for numerous sites at AFP4. Alternatives are developed separately for the EPL groundwater plume and the contaminated vadose zone soils beneath Building 181. Surfactant-enhanced pump-and-treat is identified as the most promising remedial approach for the groundwater, while soil vapor extraction (SVE) is the preferred approach for the vadose soils.
- ▶ Record of Decision (ROD) (Rust Geotech, July 1996). The ROD is consistent with the FS and identifies surfactant-enhanced pump-and-treat as the selected remedy for the EPL groundwater, while SVE is the selected remedy for the vadose soils at Building 181. An expanded SVE system at Building 181 was subsequently constructed and began operating in 1999.
- ▶ DNAPL Tracer Tests (Eckenfelder, 1998; Intera, 1998). These tests are more focused on the Building 181 and EPL groundwater and conclude that DNAPL is present under Building 181 and northeast of Building 182. However, DNAPL was not found further downgradient in the EPL.
- ▶ DNAPL Remedial Alternatives Evaluation (Jacobs, 1998b). This document evaluated a range of technologies that could be implemented to remove DNAPL, including pump and treat, surfactant flushing, in well air stripping, air sparging, soil vapor extraction, SVE thermal enhancements, multi-phase extraction, biological treatment, and in situ oxidation. The evaluation concluded that SVE combined with radio frequency heating and dewatering should undergo a pilot-scale evaluation.
- ▶ Preliminary (30%) Design (Radian, September 1999). This document provided a more focused evaluation of thermal technologies that could enhance the existing Building 181 SVE system to remove DNAPL constituents. Radio frequency heating and electrical resistance (Six-Phase HeatingTM, or SPH) underwent detailed evaluation, with SPH being recommended for a pilot-scale evaluation.

1.3 Record of Decision Requirements

The TCE contamination that was the focus of the SPH pilot test is addressed by the July 1996 ROD requirements for both the Building 181 and EPL sites. Following

acknowledgement of the previously performed interim remedial actions (IRAs) at these two sites, consisting of SVE at Building 181 and groundwater pump-and-treat (P&T) systems in the EPL, the ROD presents the selected remedies for the sites, which are:

- ▶ *Building 181*: A full-scale SVE system, with supplemental vacuum-enhanced groundwater extraction wells to collect perched groundwater situated above the underlying Terrace Alluvial groundwater; and
- ▶ *EPL*: Conventional P&T (additional wells over those installed in the IRA) with surfactant injection for DNAPL areas (assumed to be anywhere where groundwater concentrations are > 10 mg/L TCE).

The ROD-required Building 181 SVE system expansion was completed and began operation in 1999. The remedial action expansion of the EPL groundwater P&T system is currently ongoing.

The area of the SPH test, which has vadose zone and groundwater contamination, involves the selected remedies for both of these sites. Because SPH technology treats both the vadose and saturated zones, successful implementation would directly address the ROD source reduction provisions for the EPL plume, and would also expedite the Building 181 remedial action. The ROD timeframe estimates for completion of these remedial actions are 15 years for the EPL (including surfactants, rather than SPH) and 5 years for the Building 181 SVE system. Successful implementation of SPH should significantly shorten these estimated remedial timeframes. The target TCE concentrations for the remedial actions are based on protecting other resources, rather than on risk factors associated with the Building 181 vadose zone or the EPL DNAPL.

For Building 181, the intent is to reduce the TCE concentration in soils to less than 11.5 mg/kg, which, based on leaching modeling, is the allowable soil concentration to prevent underlying groundwater concentrations from exceeding the EPL ROD remedial action objectives (RAOs). Extensive previous soil sampling performed in the vicinity of the SPH test resulted in soil concentrations of up to 2,770 mg/kg, but concentrations greater than 11.5 mg/kg are infrequent and exhibit a random-like distribution. The Building 181 area that includes all known TCE concentrations in soil that are greater than 11.5 mg/kg is approximately ¼-acre. This is the target

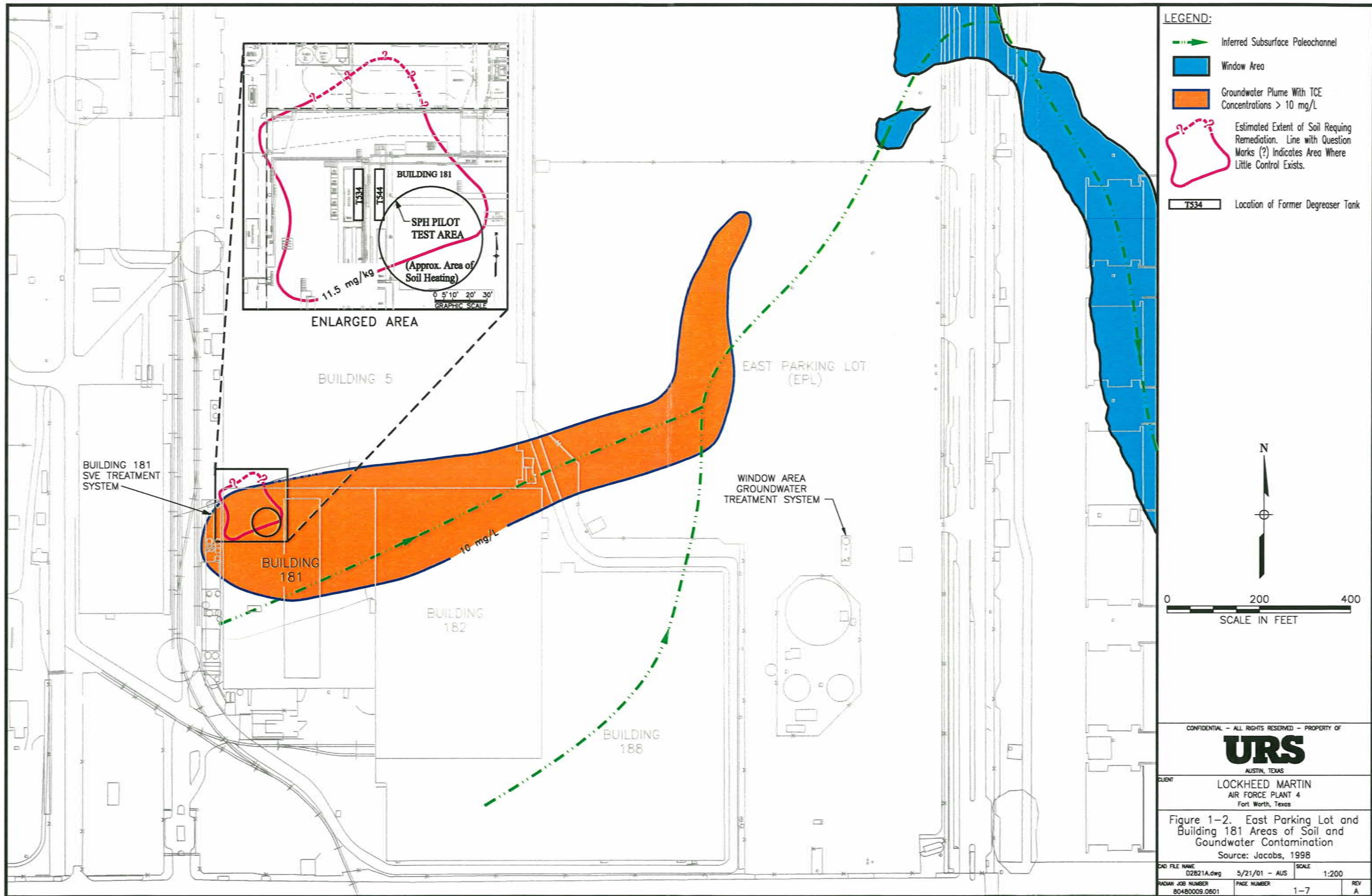
remediation area for the current Building 181 SVE system, and is also considered the source area for the EPL groundwater plume.

The EPL RAO for the portion of the groundwater plume with elevated TCE concentrations is based on protection of the deeper Paluxy drinking water aquifer. This deeper aquifer is in hydraulic communication with the shallow Terrace Alluvial aquifer through an area (termed "Window Area") without the typically intervening aquitard. TCE groundwater concentrations less than 10 mg/L should help protect the underlying Paluxy aquifer by ensuring that DNAPL does not migrate beyond the EPL P&T containment system. The 10 mg/L value (which is roughly 1% of the aqueous solubility of free-phase TCE) is often used as a preliminary indication of DNAPL presence. For the ROD, the mapped extent of dissolved-phase TCE groundwater concentrations greater than 10 mg/L, which is approximately 6 acres, was used as a basis for the estimated extent of DNAPL presence - and hence DNAPL-related remedial activities. However, the mapped extent of 10 mg/L TCE in groundwater is likely less than that for saturated zone DNAPL (if present). With source area groundwater concentrations of TCE typically over 100 mg/L, dilution/dispersion processes alone could readily account for the current downgradient expanse of the TCE plume with concentrations greater than 10 mg/L.

Figure 1-2 shows the area of the SPH test in relation to the known extent of soil contamination beneath Buildings 5 and 181 and EPL groundwater with TCE concentrations greater than 10 mg/L. Also shown on the figure are the former locations of the removed degreaser tanks T-544 and T-534 that are believed to be the source of the TCE contamination. Their central location relative to the identified soil contamination supports their source designation.

1.4 Purpose and Objectives

The purpose of the pilot-scale test was to determine the effectiveness of SPH at reducing source area concentrations of TCE in the soil and groundwater. Data gathered during the test was also intended to assist larger-scale design, should SPH prove effective. The performance objectives listed in Table 1-1 were defined to assist in measuring the effectiveness of SPH at AFP4.



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Table 1-1
SPH Pilot-Scale Test Objectives

| Performance Criteria | Performance Objective | Method of Measuring Performance |
|---|-------------------------------|--|
| Subsurface temperatures in the treatment volume | Boiling point of TCE at depth | Subsurface temperature monitoring point measurements, by CES & URS |
| Soil TCE pilot test remediation goal | <11.5 mg/kg ¹ | Pre- and post-test borehole soil sampling, by URS |
| Groundwater TCE pilot test remediation goal | <10 mg/L ¹ | Pre-test, interim and post-test groundwater sampling, by URS |

¹ These performance objectives represent a >99% and >96% reduction in soil and groundwater TCE concentrations, respectively, from the highest previous detections in the SPH test area.

The successful performance criteria for the SPH application at AFP4 will be achieving pilot test remediation goals (PTRGs), which are equivalent to previously defined remedial action objectives (RAOs), within the treatment area. This includes dissolved, sorbed and any identified free-phase volatile organic compounds (VOCs). The maximum detected soil and groundwater TCE concentrations in the pilot test area are 2,770 mg/kg and 285 mg/L, respectively.

Table 1-2 shows the previously defined statistical criteria (Radian & CES, March 2000b), involving Upper Confidence Limit (UCL) and means comparison evaluation, that are being used to help assess SPH effectiveness. The threshold values used in the comparison are the PTRGs for soil and groundwater.

Table 1-2
SPH Statistical Evaluation Criteria

| | | Comparison of UCLs to Threshold | | | |
|------------------|--|---|--|---|--|
| | | Post-treatment UCL < Threshold | | Post-treatment UCL > Threshold | |
| | | Pre-treatment UCL < Threshold | Pre-treatment UCL > Threshold | Pre-treatment UCL < Threshold | Pre-treatment UCL > Threshold |
| Means Comparison | Post-treatment mean < Pre-treatment mean (statistical significance) | <i>SPH effective even at low initial concentrations of TCE</i> | <i>SPH is effective</i> | <i>Re-evaluate statistical computations</i> | <i>SPH parameters may need adjustment, but remediation still effective</i> |
| | Post-treatment mean = Pre-treatment mean (no statistical significance) | <i>No apparent effect of SPH at low initial concentrations of TCE</i> | <i>Some evidence to indicate SPH effectiveness</i> | <i>SPH is not effective at reducing TCE</i> | <i>SPH is not effective at reducing TCE</i> |

1.5 Technology Description

SPH, a form of in-situ electrical resistive heating, remediates the subsurface by passing an electrical current through the soil matrix, including pore water. The current passage generates heat due to the soil electrical resistance. This is the same process used in any electrically heated device (clothes iron, heater, stove, etc.). Heat is generated throughout the subsurface in the target area, with a goal of increasing the temperature of the soil to the boiling point of water (80 to 100°C, depending on subsurface vacuum). Soil moisture boils into steam that travels to vapor recovery wells for removal.

SPH uses conventional single-phase transformers to convert standard three-phase electricity into six-phase electricity. Electrodes are inserted into the ground in hexagonal arrays of six per array, located 60 degrees apart both physically and electrically. Each of the six electrodes is connected to a separate transformer wire to provide it with a separate current phase. An additional, “neutral” electrode is located at the center of the array. The hexagonal shape electrode array was chosen because it provides a more uniform distribution of electrical currents in the subsurface than other geometric layouts.

Each electrode conducts electricity with as many as six other nearby electrodes. In addition to flowing along the straight-line path between the electrodes, the current also fans out slightly as shown in Figure 1-3.

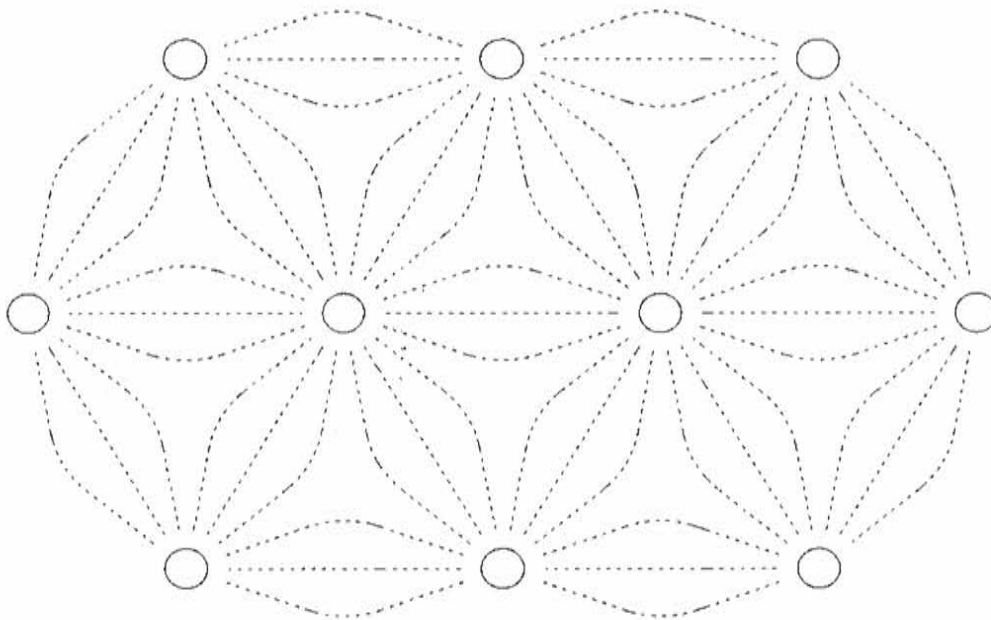


Figure 1-3. Representation of SPH Electrical Current Distribution

The electrical current also fans out in the vertical direction, treating soil that lies in the conductive depth interval of the electrodes plus soil that lies up to 5 feet above or below the conductive interval. The result of this electrical current is very even heat generation in the subsurface that leads to uniform steam production and VOC volatilization throughout the treatment volume.

1.5.1 AFP4 Application

At the AFP4 site an existing SVE system was used to apply vacuum to the vapor recovery wells (including those installed for this test) and pull steam, air, and VOC vapor to the surface. High-temperature CPVC piping was used to convey the vapor from the wells to the CES steam condenser. Following steam condensation, the condensate was pumped into the existing groundwater treatment unit, and ultimately sent to the sanitary sewer through a permitted discharge. VOC vapors and air were conveyed from the condenser by the existing vacuum blower and then discharged to the atmosphere, following treatment. Figure 1-4 shows a photograph of the site during the operation phase. Figure 1-5 depicts the SPH process flow diagram for the AFP4 test.

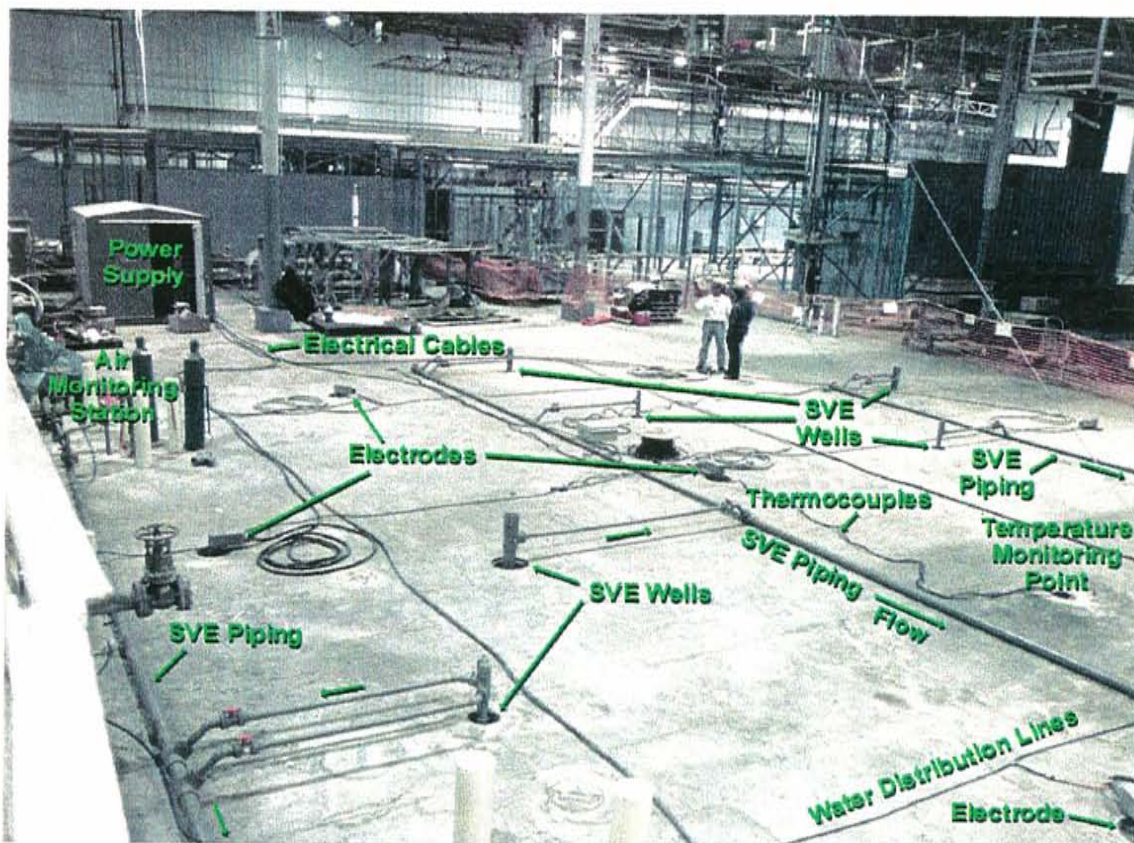


Figure 1-4. Photograph of Test During Operation

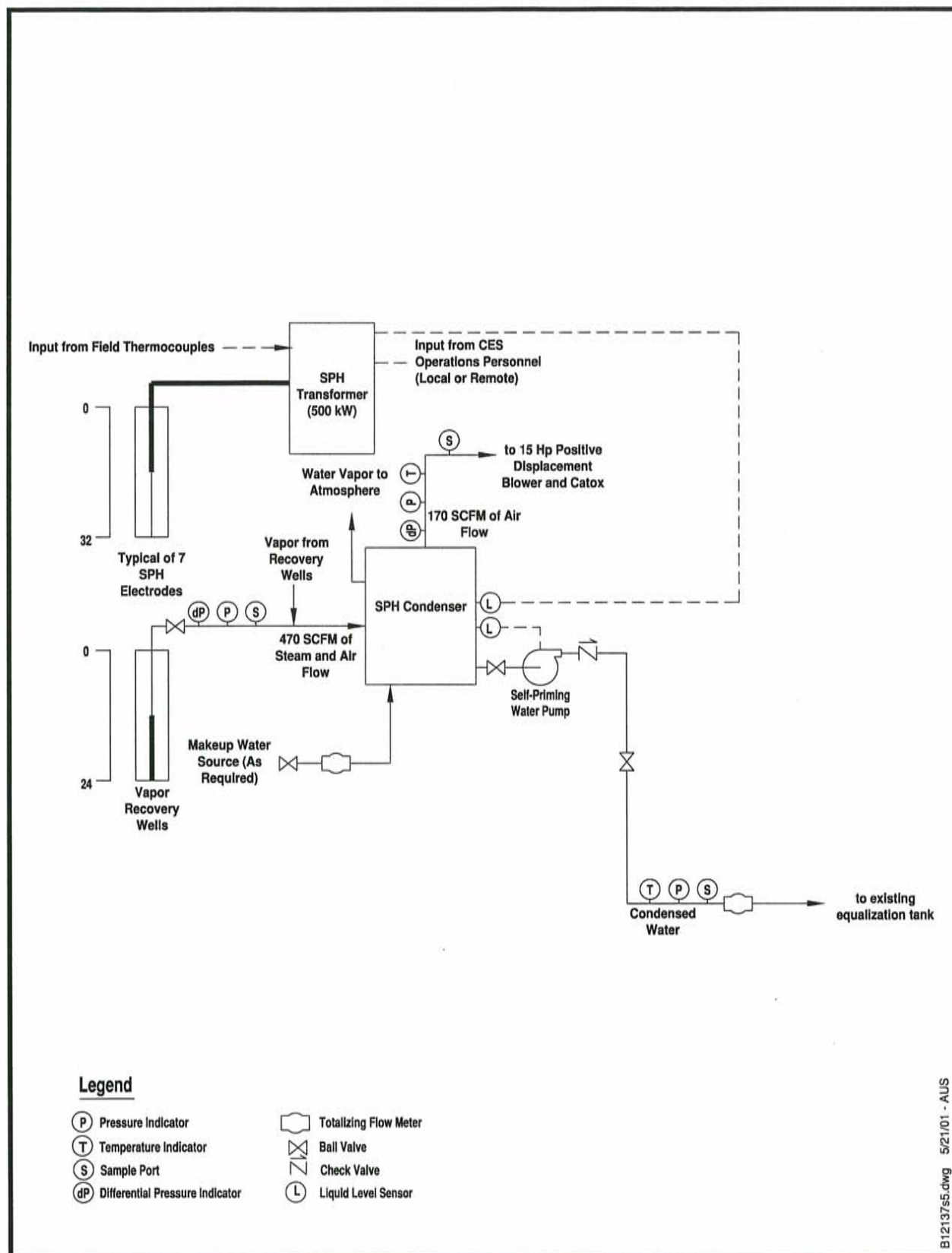


Figure 1-5. SPH Process Flow Diagram

The following technology and site characteristics made SPH a promising remediation technique for the AFP4 application:

- ▶ Heat is generated uniformly throughout the treatment volume. Low permeability lenses reduce the performance of pump-and-treat, soil vapor recovery, and other technologies that rely on the movement of a fluid or vapor through the soil matrix. Soil heterogeneity or low permeability does not adversely effect SPH. In fact, low permeability soils, which are common in the AFP4 subsurface, tend to carry a greater current than sandy soils and thus receive more heat and boil faster;
- ▶ The boiling of soil moisture and groundwater in clay lenses will form steam that will sweep out VOCs. This steam stripping process effectively increases the permeability of clay soils;
- ▶ Because SPH treats all soils in the treatment volume, there is less likelihood of untreated regions from which contaminants could diffuse later and cause rebound. Rebound has not been observed at any SPH site;
- ▶ TCE boils at 87° Celsius (73° C if in contact with water). This temperature is below the boiling point of water, which is achievable with the SPH technology; and
- ▶ There are existing SVE and groundwater treatment systems at the site to capture vapors and treat condensate, respectively.

1.6 Summary of Field Activities

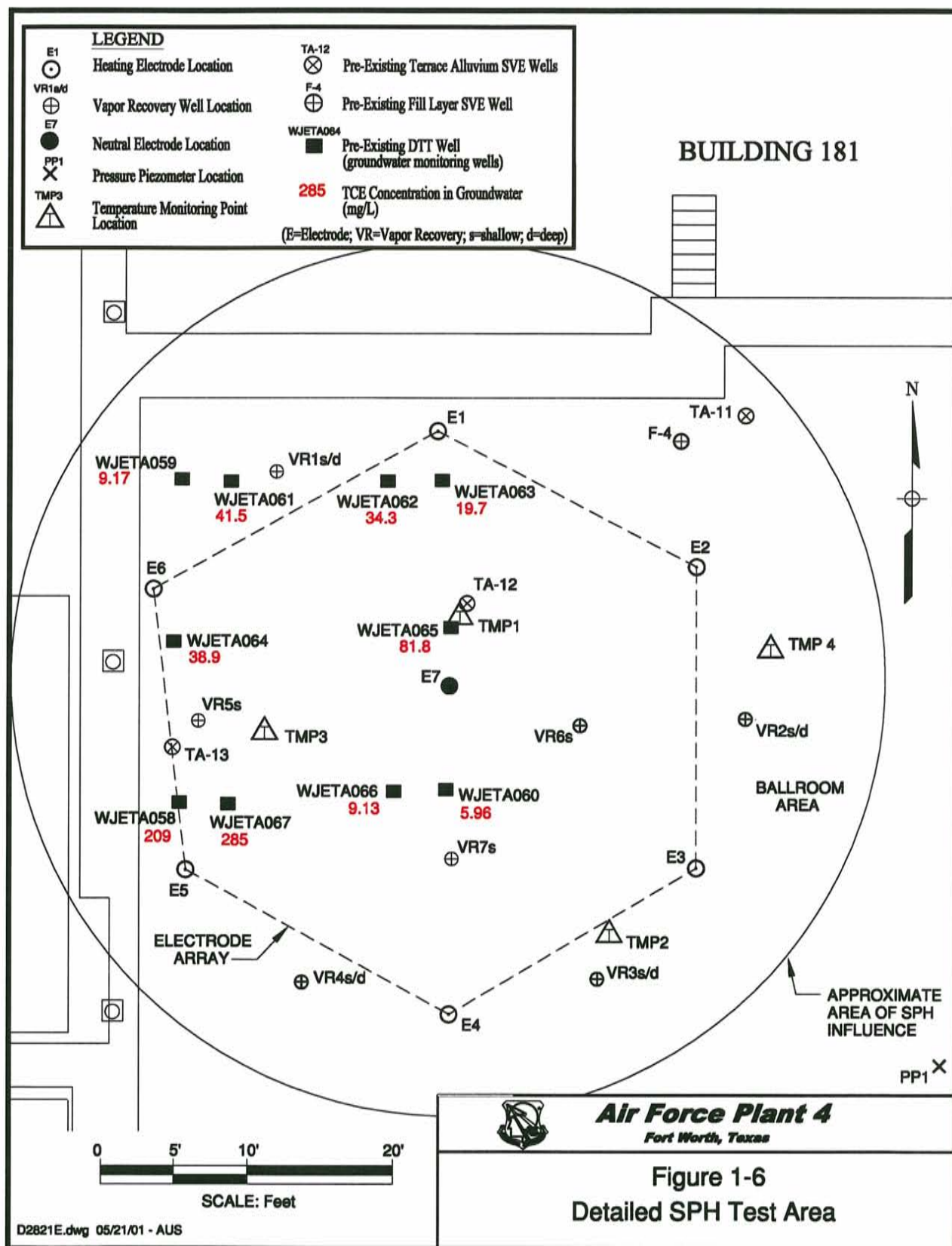
Table 1-3 lists the type and number of field activities performed during the SPH pilot-scale test. Figure 1-6 shows the SPH site plan, including the 10 wells where groundwater sampling was performed (WJETA058 - WJETA067) and the three temperature monitoring point (TMPs) locations (TMP1, TMP2, & TMP3) where the pre-test soil sampling was performed. Also shown on the figure are the pre-test TCE concentrations in groundwater at the 10 wells.

Lithologic and completion logs for all SPH borings and subsurface installations are contained in Appendix A. State of Texas well reports are provided in Appendix B.

Table 1-3
SPH Field Activities Summary

| Activity | Number |
|---|---------------------------------------|
| Soil Borings for Electrode Installations | 7 |
| Soil Borings for Vapor Recovery Well Installations | 7 (11 vapor recovery wells installed) |
| Soil Borings for Temperature Monitoring Points | 4 (7 thermocouples in each) |
| Sample Soil from 3 TMP Boreholes | 30 (2 rounds of 15) |
| Sample Existing Groundwater Monitoring Wells ⁽¹⁾ | 46 (4 rounds of 10, 2 rounds of 3) |
| Sample Condenser Discharge | 10 |
| Sample Vapor Stream | 20 |
| Sample Drill Cuttings | 2 (for waste characterization) |
| Sample Interior Building Air Quality | Continuous with GC/PID |
| Perform Helium Tracer Recovery Tests | 18 (3 tests at 6 locations) |

(1) For chloride and total organic carbon analysis, numbers were 23 and 10, respectively.



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2.0 SITE AND OPERATING CONDITIONS

This section details the SPH test location, subsurface and contaminant characteristics, design parameters, and operating conditions.

2.1 Pilot Study Location and Features

Figure 2-1 shows the expanded pilot test area, in a portion of Building 181 informally termed the “ballroom.” URS and CES selected this area because it was believed to contain DNAPL, and also situated such that AFP4 operations were minimally impacted during the testing period. Since the test area is adjacent to the degreaser tanks and the spill/leaks believed to be the major source of the EPL plume, it contains some of the highest TCE concentrations at the site.

Several factors weighed heavily in selecting the ballroom site. First, previous soil sampling results show the highest detected vadose zone TCE levels ($> 1,000$ mg/kg) in this area. Also, groundwater samples taken from this area, from wells used in the previous DNAPL tracer test (DTT) performed within Building 181, consistently contain TCE levels over 5 mg/L and average about 75 mg/L. Furthermore, as seen on Figure 2-1, there are four existing SVE wells in the proposed pilot scale test area, TA-11 through TA-13 and F-4 (TA = Terrace Alluvium extraction well and F = Fill layer extraction well) and the 10 DTT wells (WJETA058 through WJETA067). The four SVE wells were used to help capture vapor during the test, along with the 11 vapor recovery wells installed for the test. The 10 DTT stainless steel wells were used as groundwater monitoring points. The DTT wells each have 5-foot screened intervals (generally comparable to the saturated thickness of the aquifer in the test area) that are typically below the potentiometric surface in the area (i.e., the screened interval is fully covered with water).

Another important factor in the selection of the SPH test location was the presence of the nearby treatment facility for the Building 181 SVE network. The use of this facility to treat vapor and condensate generated by the SPH process helped reduce the pilot test costs and minimized generated wastes (e.g., spent carbon). The treatment system was capable of handling the additional waste streams from the SPH test under the Texas Natural Resource Conservation Commission (TNRCC) requirements in 30 TAC 106.533, Water and Soil Remediation. Before Jacobs Engineering began construction of the SVE system expansion in Building 181, they submitted Form PI-7 to the TNRCC to obtain a standard exemption. As part of the submittal, Jacobs estimated the maximum TCE emissions as 3.34 lbs/hr (4.7 tons/yr) assuming 90% removal across the CATOX unit. (The treatment unit was designed to handle an influent flow

rate of 970 scfm and a TCE concentration of 1,700 ppmv.) Since the emission limits and monitoring requirements remained the same as prior to the heating, no further permitting activities were required.

Underground utilities in the SPH test area consisted of a 10-inch concrete storm sewer and an 8-inch cast iron sanitary sewer line. Their exact locations were verified with LM Aero personnel prior to drilling. Because these utilities are relatively shallow (approximately 5 feet below ground surface, or bgs) and made of heat resistant materials, the likelihood of SPH-related damage was assumed to be minimal. However, prior to the SPH test a corrosion analysis was performed (Appendix C) to help confirm that the planned resistive heating would not appreciably accelerate natural corrosive processes on the cast iron pipe.

Figure 2-1 also shows the electrical connections to the SPH power supply, and the vapor recovery piping, installed for the SPH pilot test. Captured vapors were routed to the SPH condenser outside of Building 181. After passing through the condenser, the vapors and resulting condensate were treated in the existing treatment facility.

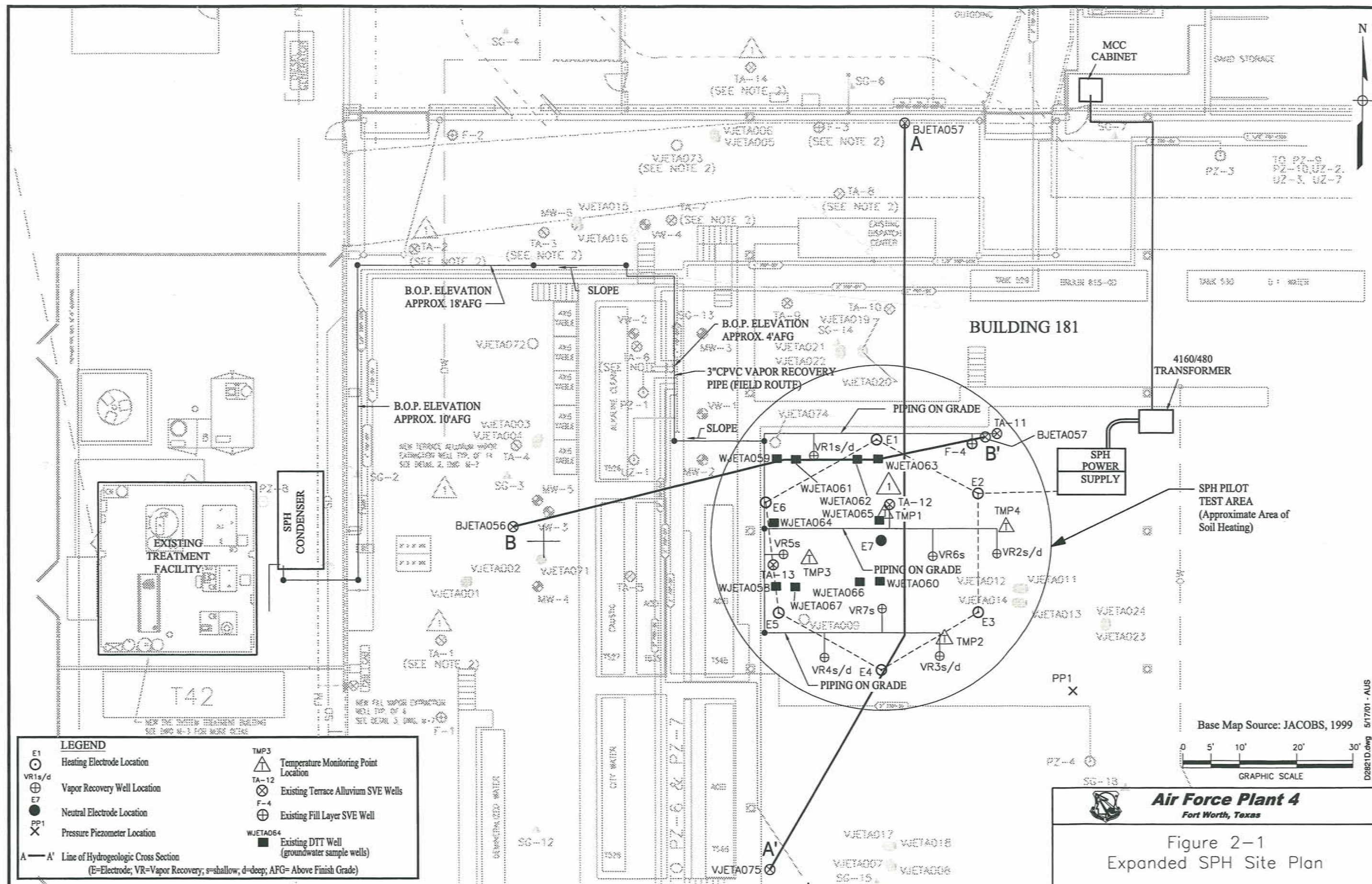
2.2 Geology

The geologic units encountered during SPH drilling consist of the following, in descending order, from land surface:

- ▶ Fill materials;
- ▶ Terrace Alluvium; and
- ▶ Goodland Limestone.

Following is a brief description of the properties of each of these units.

Fill – Fill material at AFP4 consists of variable mixtures of clay, silt, sand, and gravel. Because the fill material is difficult to distinguish from the Terrace Alluvium (most fill was apparently obtained from the local Terrace Alluvium deposits), these units are often not differentiated. However, in the SPH test area the fill material, which is generally encountered within the first five feet beneath the building slab, is differentiated for SVE well purposes and apparently has greater permeability (and thus air flow) than the underlying Terrace Alluvium.



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Terrace Alluvium – The Terrace Alluvium underlies the fill and consists of heterogeneous, interbedded clay, silt, and poorly to moderately sorted sand and gravel that were deposited by fluvial processes. Individual interbeds are continuous only over very short distances. The clastic materials consist primarily of limestone and shell fragments, with quartz sand being a minor constituent.

Vertically, the Terrace Alluvium can be divided into two general lithologies: 1) a shallower unit composed of varying amounts of clayey silt and silty clay; and 2) a deeper silty or clayey sand and gravel unit, usually saturated, that immediately overlies the bedrock. The combined depth of the fill/Terrace Alluvium averages about 30 to 34 feet bgs in the SPH test area.

SPH borings encountered heterogeneous conditions. In general, the profile consists of clay and silt-dominated materials through the vadose zone, grading with depth to gravelly, sandy clay. The basal gravel, where present, is relatively thin (generally less than 5 feet thick). Water saturation was usually noted in the cores at between 27 and 30 feet bgs, and depth to competent bedrock (and thus auger refusal) ranged from about 31 to 34 feet under the building. The saturated basal units contain considerable clay and silt in the matrix, which reduce the permeability.

Goodland Limestone – The Goodland Limestone is present beneath the Terrace Alluvium in the pilot test area, and is reported to have a maximum thickness of less than 10 feet.

Although not encountered during SPH drilling, the Walnut Formation reportedly underlies the Goodland Limestone in the test area, and is about 30 feet thick (Parsons, 1998).

2.3 Hydrogeology

The hydrogeologic interval of interest for technology evaluation purposes is the shallow aquifer within the Terrace Alluvium and the upper weathered portion of the underlying Goodland Limestone or Walnut Formation. The underlying, more competent bedrock of the Goodland Limestone and Walnut Formation are assumed to comprise an effective aquitard where thickness (individual or combined) is greater than 5 feet. This appears to be a valid assumption at the site since groundwater contamination in the underlying Paluxy Aquifer appears to be limited to areas where these units are thin or absent. Laboratory permeability tests show a geometric mean of 7×10^{-10} cm/sec for the hydraulic conductivity of the Walnut Formation.

Pumping tests performed during the DNAPL tracer tests (Eckenfelder, 1998) showed transmissivity (T) is very heterogeneous in the Building 181 pilot test area. Within this area, the geometric mean of eight T values ranged from about 32 to 38 m²/day, or about 340 to 410 ft²/day, and storativity was 0.016 and 0.009, for the Theis and Cooper-Jacob analysis methods, respectively. The geometric mean of the hydraulic conductivity (K) values, assuming a saturated thickness of 5 feet, were 2.4 to 2.9 x 10⁻² cm/sec, or 68 to 82 ft/day, for the respective analysis methods. Individual well sustainable pumping rates ranged from less than 0.4 to approximately 2.8 gpm.

2.4 Conceptual Site Model

The information used to help develop the conceptual site model (CSM) was gathered from several existing AFP4 reports, most notably the:

- ▶ *Record of Decision* (Rust Geotech, 1996);
- ▶ *Remedial Alternatives Evaluation* (Jacobs, 1998b);
- ▶ *Draft East Parking Lot/Window Area Technical Report* (Jacobs, 1998a);
- ▶ *Technical Report on the Geology of Air Force Plant 4 and Naval Air Station Fort Worth Joint Reserve Base* (Parsons, 1998), and
- ▶ *DNAPL Tracer Tests, Air Force Plant 4* (Eckenfelder, 1998).

In addition to these reports, data gathered while installing the SPH test subsurface components were used to develop the CSM .

Figure 2-2 shows a cross section CSM that includes the SPH pilot test location. Although previous reports describe the potential for several source areas, the main source area is presumed to be the former leaking tanks in Building 181, adjacent to the SPH test location. The CSM depicts that from the release area, TCE migrated through breaches in the concrete floor to the underlying vadose zone.

In the SPH test area, an approximately 5-foot thick fill layer underlies the building floor. Much of the TCE accumulated at the interface of the fill layer with the underlying, lower-permeability Terrace Alluvium deposits. This premise was supported during SPH drilling activities, during which the most elevated VOC field screening values occurred at this interface.

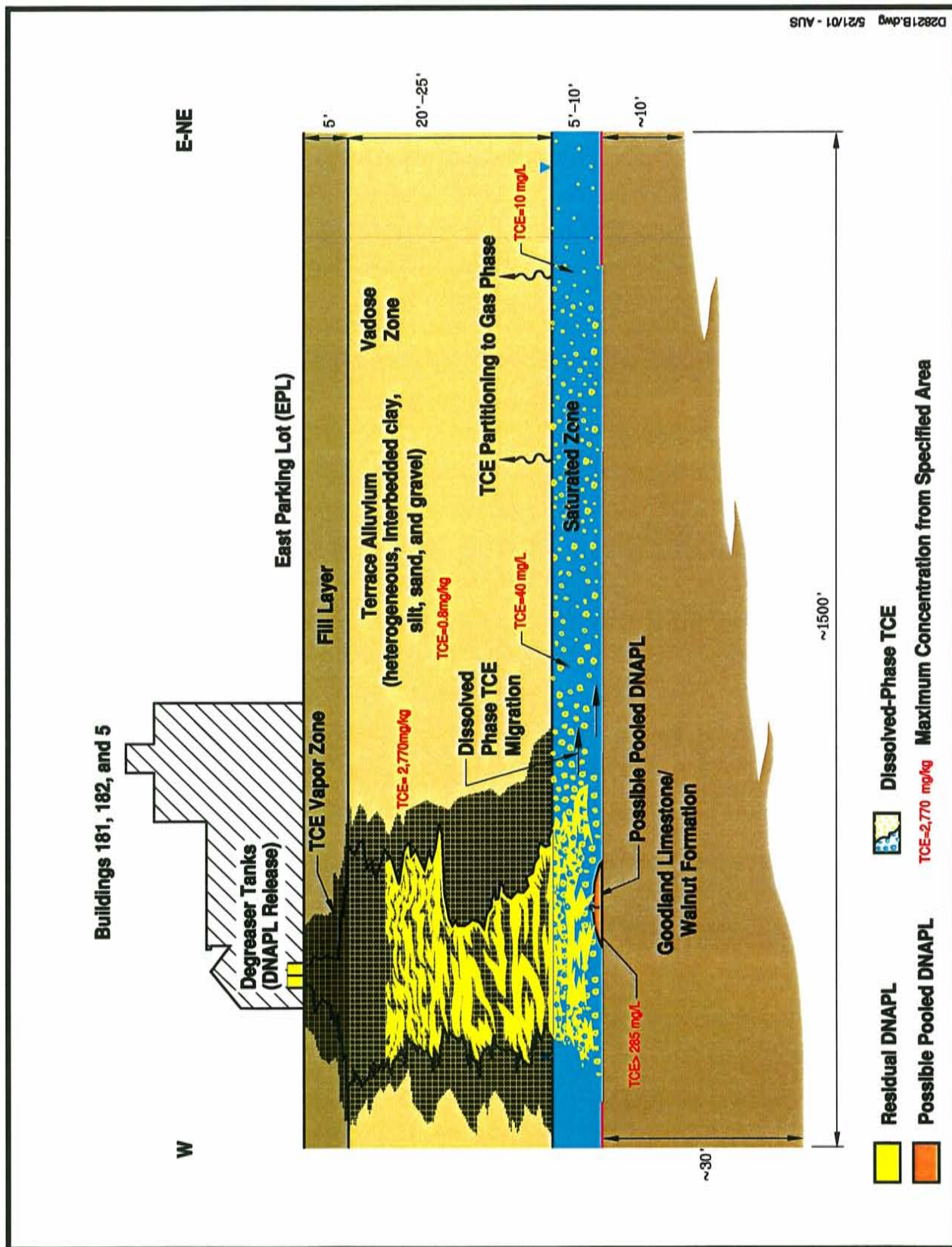


Figure 2-2. Building 181 and EPL Conceptual Site Model

From the fill/alluvium interface, the DNAPL likely migrated downward by gravitational force into, and possibly through, the approximately 25-foot thickness of interbedded, primarily fine grained sediments comprising the Terrace Alluvium. This downward migration was impeded, and likely diverted, by numerous lenses of finer grained silts and clays. A significant percentage of the TCE was left as residual DNAPL in the vadose zone, where further movement is expected to be insignificant, especially considering that under the concrete floor of the building there should be little if any infiltrating water to further entrain the TCE. The CSM assumes vadose zone contamination with residual DNAPL is limited to the vicinity of the former spills in Building 181.

The elevated TCE groundwater concentrations under the presumed main source area indicate that free-phase TCE reached the underlying water table. Once in the saturated zone, the free-phase TCE would continue a primarily downward migration toward the more competent underlying limestone and shale. As in the vadose zone, a significant amount of TCE would be left as residual in the saturated zone. Another CSM assumption is that there is insufficient DNAPL volume to pool at the bedrock interface (or just very locally), and instead there is primarily residual DNAPL within the pore spaces of the aquifer. This interpretation would be consistent with the results of the DNAPL tracer test (DTT) performed in Building 181 (which used the same wells sampled for groundwater TCE concentrations during SPH), especially considering that the DTT is not geared for determining the mass of pooled DNAPL – instead performed to determine the mass of non-pooled, residual product.

Areas of uncertainty with respect to the CSM are:

- ▶ Did a sufficient mass of DNAPL migrate through the saturated zone to allow pooling; and
- ▶ If DNAPL pooling occurred, to what degree and how much free-phase migration has occurred?

Earlier interpretations of DNAPL distribution in the subsurface assumed the DNAPL migrated to the saturated zone in sufficient volume to allow pooling at the alluvium/limestone (bedrock) interface. It was conceptualized that, once pooled, the DNAPL migrated along lows in the bedrock upper surface to the mapped location of a nearby former stream channel, or paleochannel (approximately 150 feet south of SPH test area, see Figure 1-2). The paleochannel runs to the east-northeast, and usually contains the thickest accumulations of coarser-grained

sands and gravel. Neither the occurrence or extent of lateral DNAPL migration in the paleochannel were understood, but migration was estimated as far as the eastern edge of the building complex. These earlier interpretations assumed that DNAPL was present below the water table because of the relatively elevated TCE concentrations in groundwater, and more recently by the results of two DTTs, one performed within Building 181, and the other just outside of Building 182. Historical site groundwater concentrations of greater than 200 mg/L TCE are well above the 1% of TCE solubility rule-of-thumb that has been used as an indicator of DNAPL presence, and was used in the ROD to indicate DNAPL extent (i.e., DNAPL was assumed to be present beneath the water table everywhere that TCE groundwater concentrations were > 10 mg/L). The 10 mg/L TCE isocontour in groundwater was used to prepare the previous CSM (Radian, March 2000a), and suggested a mobile DNAPL plume; however, the previously assumed DNAPL extent is not generally supported by fairly extensive direct site data.

Evidence for the lack of a mobile DNAPL are visual and VOC screening results from the numerous borings performed in the source area. For example, the 10 DTT well borings were advanced to the underlying bedrock and hydrophobic dye was used where the most elevated PID readings occurred to try and detect DNAPL – none was observed or confirmed with the dye testing. In addition, there have been over 20 additional boreholes drilled to bedrock within the SPH pilot test area without any visual observation or sampling confirmation of DNAPL. Stepping further out, and including the numerous other boreholes drilled within Building 181 for investigative or well placement purposes, there has never been confirmation of DNAPL below the water table. Furthermore, the typical pattern of increasing TCE concentrations with depth through the saturated zone have not been observed.

2.5 Contaminant Properties

Table 2-1 lists some of the key properties of TCE, the target contaminant for the SPH pilot-scale test.

Table 2-1. Select TCE Properties

| Property | Units | Value |
|-------------------------------------|---------------|-----------------------------------|
| Chemical Formula | - | $\text{Cl}_2\text{C}=\text{CHCl}$ |
| Molecular Weight | g/mole | 131.5 |
| Specific Gravity | - | 1.46 @ 20°C |
| Boiling Point | °C | 86.7 |
| Vapor Pressure | mm Hg | 60 @ 20° |
| Water Solubility | mg/L | 1100 @ 25°C |
| Octanol-Water Partition Coefficient | $\log K_{ow}$ | 2.29 – 3.30 |
| Soil-Sediment Sorption Coefficient | $\log K_{oc}$ | 1.81 – 2.10 |
| Flammability | - | LEL – 8% UEL – 10.5% |

Table 2-2 shows the general TCE contaminant distribution with depth in the SPH test area, based on numerous soil and groundwater sample results. As previously discussed, the most elevated TCE detections occur close to the fill/alluvium contact.

Table 2-2. SPH Test Area TCE Concentrations by Depth

| Depth Below Ground Surface (ft) | TCE Concentration |
|---------------------------------|-------------------|
| Soils | (mg/kg) |
| 0 to 5 | < 1 to 1,280 |
| 5.5 to 10 | < 1 to 2,770 |
| 10.5 to 15 | < 1 to 1.5 |
| 15.5 to 20 | < 1 |
| 20.5 to 25 | < 1 to 27.1 |
| 25.5 to 30 | < 1 to 5.4 |
| 30.5 to 32.5 | < 1 to 2.5 |
| Groundwater | (mg/L) |
| 28 to 32.5 | 9.1 to 285 |

Note: Groundwater is usually first encountered at about 27-30 feet bgs in the SPH test area.

Figures 2-3 and 2-4 are north-south and west-east cross sections, respectively, through the Building 181 pilot test area. In addition to the shallow geology, the cross sections show the previously detected TCE concentrations in the soil and groundwater, the screened intervals of the DTT wells, and the potentiometric surface within the lines of section. For all borings displayed on the cross sections, auger refusal is interpreted as the top of the underlying bedrock.

Figure 2-3 shows the complexity of the shallow geology on the local scale, with the coarser grained sand and gravelly zones generally being discontinuous laterally, in some instances abruptly terminating within distances of less than 10 feet. The exception to this is the generally constant five-foot thickness of the overlying fill material. Within the Terrace Alluvium, silt is the predominant lithology, and even the gravelly zones have a significant silt and/or clay component. In this line of section, the approximate extent of the heating zone created by SPH operations is depicted at the top of the cross section. The most elevated detection of TCE in the vadose zone occurs at five feet bgs at WJETA060, with a concentration of 0.865 mg/kg. Below the potentiometric surface, a TCE concentration of 1.53 mg/kg was detected in soil near the bottom of the boring at WJETA065. TCE concentrations in the groundwater in the three DTT wells shown on the cross section ranged from 19.7 to 81.8 mg/L in the pre-test baseline sampling.

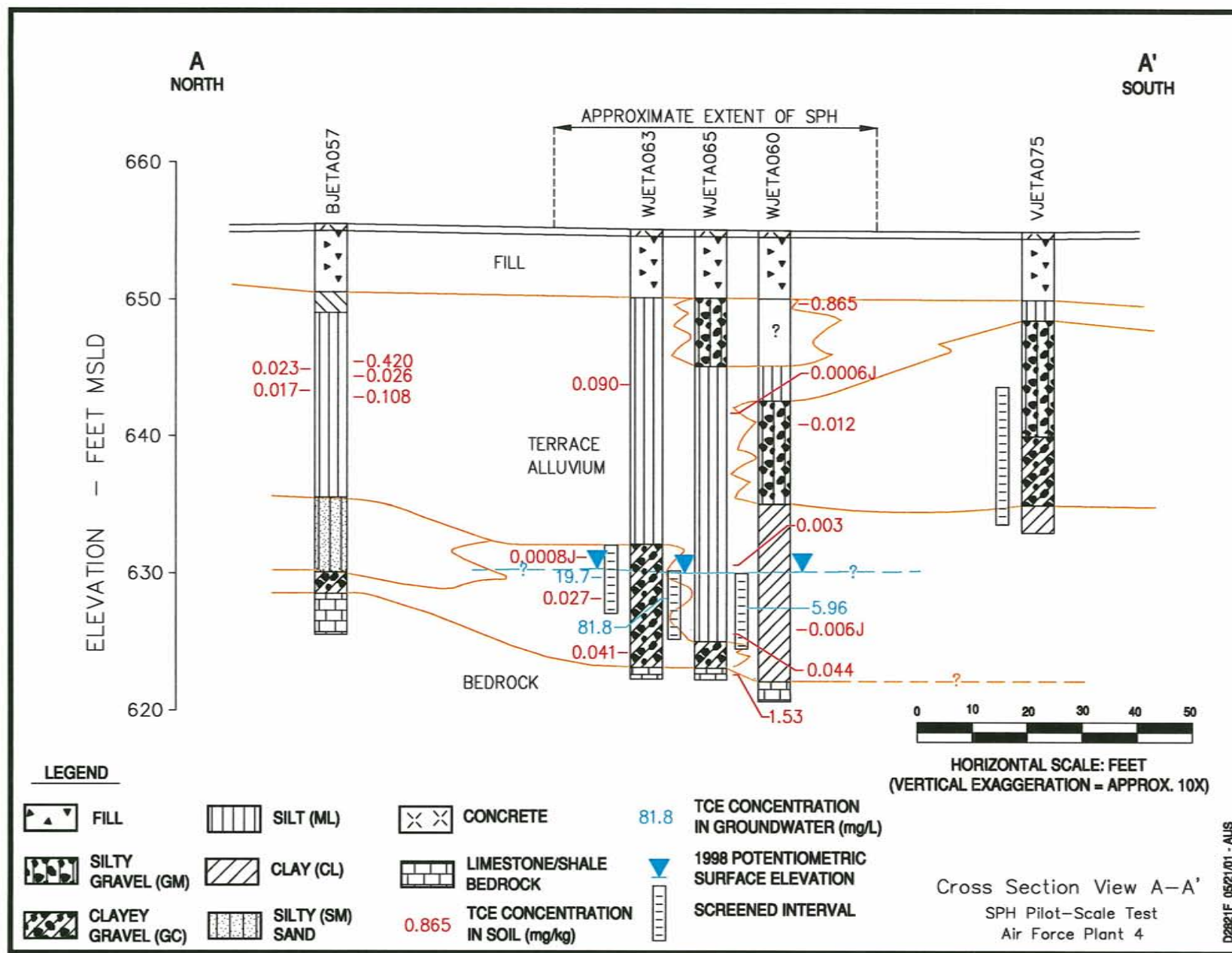


Figure 2-3. Hydrogeology and Contaminant Distribution along Cross Section A-A'

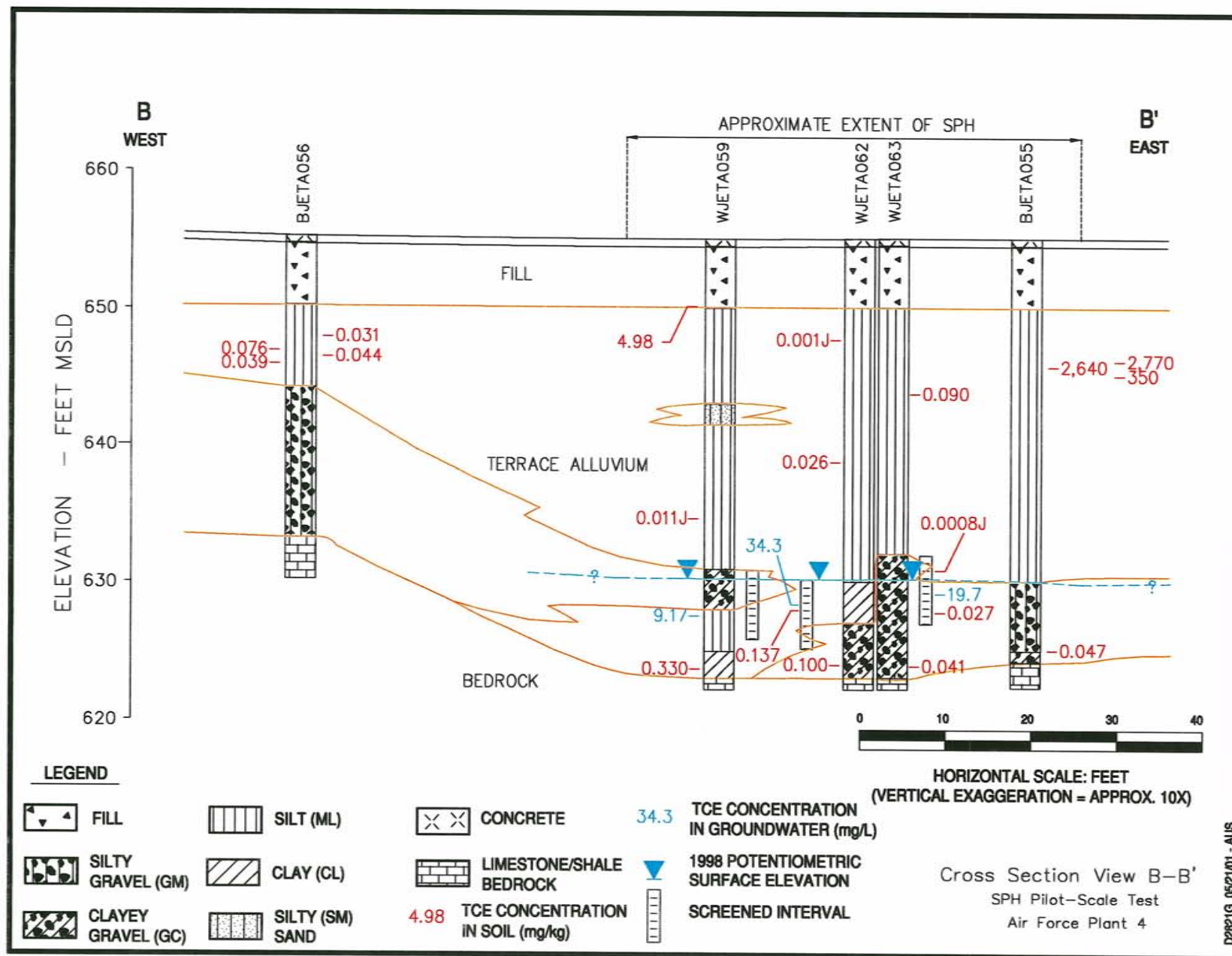


Figure 2-4. Hydrogeology and Contaminant Distribution along Cross Section B-B'

Figure 2-4 shows similar complexity in the shallow geology, except the coarser-grained fraction appears to be more restricted to the lower portions of the Terrace Alluvium. Again, the fill layer appears to be a relatively consistent five-foot thickness throughout the area depicted in the cross section. The most elevated levels of TCE in soil occur at borehole BJETA055, with a concentration up to 2,770 mg/kg at nine feet bgs. This is the highest detected concentration of TCE from soils collected beneath Building 181, and this location was within the SPH heating zone. Pre-test TCE concentrations in groundwater in the three wells shown in the cross section range from 9.17 to 34.3 mg/L.

2.6 Pilot Test Matrix Characteristics and Design Parameters

General matrix properties for the SPH pilot test area, based on a review of available data and SPH field test results, are provided in Table 2-3. SPH pilot-scale test design parameters are shown in Table 2-4.

2.7 Indoor Air Monitoring

Ambient air monitoring was performed throughout the field portion of the SPH test at AFP4. Following are descriptions of the various types of indoor air monitoring performed during the pilot test.

Table 2-3
SPH Test Area Matrix Characteristics

| Parameter | Value |
|---|--|
| Average Terrace Alluvium Geotechnical Properties | |
| - vadose zone moisture content | 11.7% |
| - bulk density | 110 lb/ft ³ |
| - particle specific gravity | 2.68 |
| Average Terrace Alluvium Hydrogeologic Properties | |
| - vadose zone thickness | 27.5 ft |
| - saturated zone thickness | 2 – 7 ft |
| - hydraulic conductivity | 75 ft/day (2.6×10^{-2} cm/sec) |
| - hydraulic gradient | 0.008 ft/ft |
| - seepage velocity | 0.6 ft/day |
| - porosity | 25% |
| - pressure condition | Variable confined-unconfined |
| - flow direction | Easterly to southeasterly |
| Average Terrace Alluvial Groundwater Properties | |
| - temperature | 22°C |
| - pH | 7.0 |
| - alkalinity | 250 mg/L |
| - oxidation/reduction potential | 210 mV |

Table 2-4
SPH Pilot Test Design Parameters

| Parameter | Design Basis |
|---|--|
| Shape of the remediation area | Circular – approximately 63 feet in diameter |
| Approximate size of the area | 3,120 square feet (heated area, assuming 45 ft diameter array and heating zone extending 1.4 X array diameter) |
| Minimum volume treated | 3,930 cubic yards (from 2.5 to 37 feet bgs) |
| Depth to groundwater | Approximately 30 feet bgs |
| Top of the upper electrically conductive interval (average) | 7 feet bgs |
| Bottom of the electrically conductive interval | 32 feet bgs |
| Minimum depth of remediation ¹ | 2.5 feet bgs |
| Maximum depth of remediation ¹ | 37 feet bgs |
| Primary contaminant | TCE |
| General soil type in vadose zone | Clayey sand, sandy clay, gravelly clay |
| General soil type in saturated zone | Silty or clayey sand with possible gravel layer on bedrock surface |
| Site cover | 100% building foundation |
| Final subsurface temperature | Boiling point of site groundwater |
| Organic carbon content of soil | Estimated to be between 0.05% and 0.20% |
| Soil resistivity | Average of 10.7 ohm-m (SETI ² results) |
| Power input to subsurface | 325-500 kW |

¹ Active resistive heating extends at least 5 feet beyond the bottom of the electrodes and approximately 9 feet beyond the diameter of the electrode field. Heating above the electrically conductive interval(s) is accomplished by steam rising toward the vapor collection wells.

² Site Evaluation Test Instrument

- ▶ *Accuro Bellows Pump and Drager Detector Tubes:* Special caution was taken during drilling to test for carbon monoxide (CO) in air, to ensure the safety of the workers. During each drilling shift (performed at night), several measurements for CO were taken using an Accuro bellows pump and 2-300 ppm CO Drager detector tubes.
- ▶ There were infrequent detections of CO, and none greater than 1/10 of the OSHA personal exposure limit (PEL) of 50 ppm.
- ▶ *Sentex Gas Chromatograph (GC):* A Sentex GC was installed at the site on 24 May 2000, and several months of baseline indoor air quality data were collected prior to the start of the SPH test on 7 August 2000. The collector tube for the GC was positioned at approximately breathing zone height, within the SPH heating array. The GC was programmed to automatically collect air samples on approximately 15-minute intervals, and to recalibrate on a daily basis. The GC operation was checked daily by onsite personnel during active heating. Offsite personnel also regularly checked and downloaded the data via a remote computer connection. The GC was analyzing TCE in air concentrations, which have an OSHA PEL of 100 ppm (and a

self-imposed site action level of 25 ppm). During the six months of GC monitoring, none of the indoor air TCE concentrations exceeded 1 ppm.

- ▶ *MicroTIP Photoionization Detector (PID)*: An onsite MicroTIP PID was calibrated daily with both outside air and 100 ppm isobutylene gas. The PID was used regularly during drilling, startup, and operation to monitor ambient air VOC concentrations. Because it was more mobile than the onsite GC, the PID was used to routinely check for VOC levels around site features, such as cracks in the concrete floor of the building or around wellheads. Throughout the field program, there were no VOC detections in ambient air above 5 ppm.

2.8 Subsurface Pressure Condition

Vapor recovery (VR) well flows were monitored and calculated by onsite personnel by routinely taking vacuum, differential pressure, and temperature measurements through fittings installed at the 15 VR well heads (11 installed for SPH test and 4 existing SVE wells). The well vapor flows were calculated using the following formula taken from the *Dwyer Series DS-300 Flow Sensor Installation and Operating Instructions, Flow Calculations, Bulletin F-50*.

$$\text{Vapor flow} = 128.8 * K * (D)^2 * \sqrt{((P * dP) / (T * SG))}$$

Where:

$K = 0.58$ (pitot tube constant for 1-1/4" pipe)

$D = 1.256$ (inside pipe diameter in inches)

$P = 14.7$ psi-vacuum (absolute pressure in psia)

dP = Manometer differential pressure (inches water)

T = Temperature (degrees Rankine)

SG = Specific Gravity of gas (with respect to air)

Figure 2-5 shows the average well flow versus temperature for the test. The data in the figure indicate that as subsurface (and vapor) temperatures rise, vapor flow increases. The exception to this occurred during the second week, when the decrease in flow rate was probably a result of the blower not operating for 25 hours. The last few weeks of heating were performed remotely, thus no data were collected past October 6th.

Subsurface vacuum and temperatures were also monitored regularly through the TMPs. Following are descriptions of the various requirements.

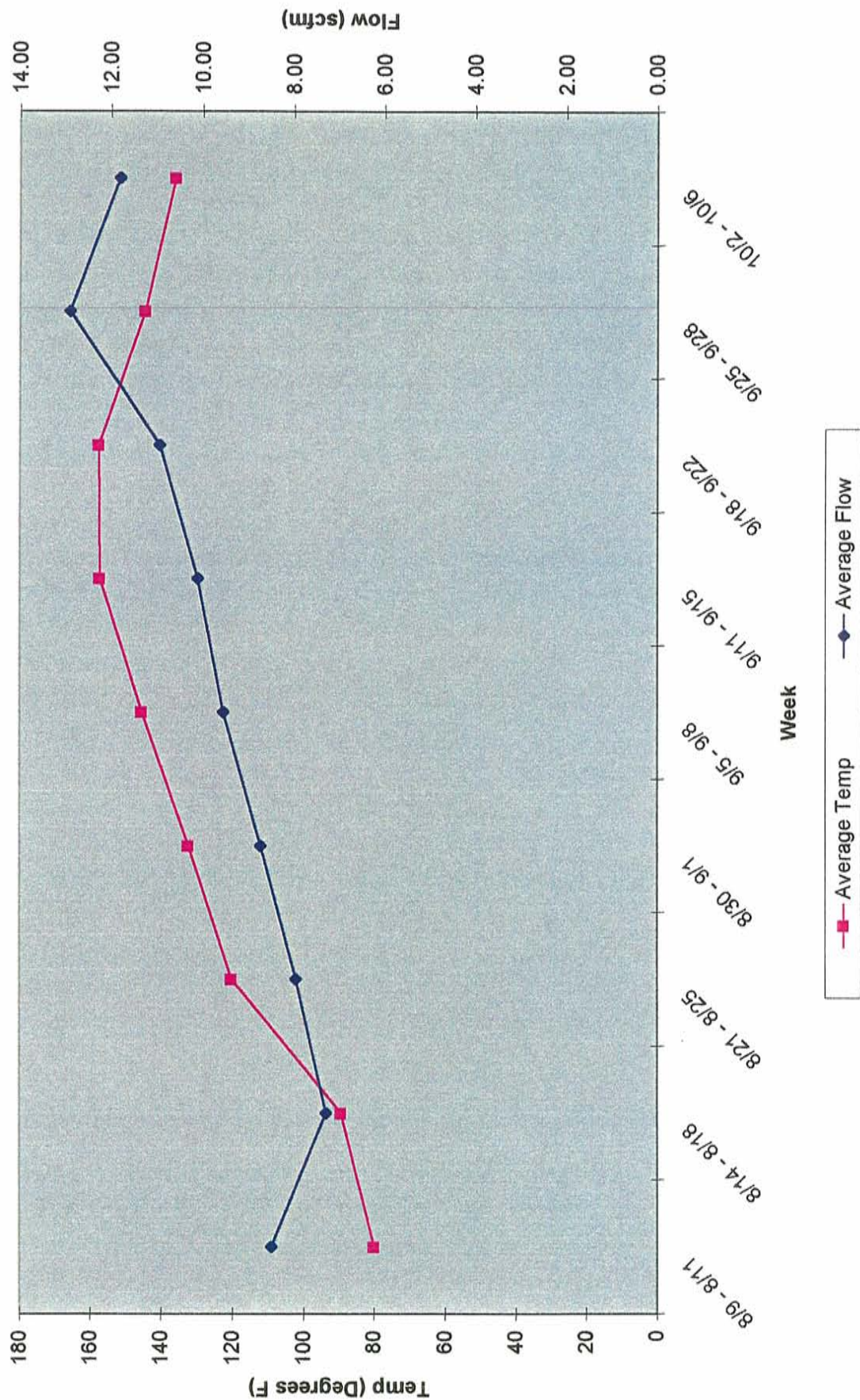
Vacuum (Subsurface/Wellhead):

- ▶ A vacuum gage was used to measure the vacuum in inches of mercury. Readings were taken at each VR wellhead as well as the inlet and outlet of the heat exchanger. These readings were used in the calculation of well vapor flow.
- ▶ Subsurface vacuum was monitored by using a digital handheld manometer. At each TMP, three tubes were installed at depths of 5, 15, and 25 ft bgs. Negative subsurface pressure (vacuum) was measured in inches of water by attaching the subsurface tubing to one side of the manometer, and leaving the other side open to the atmosphere. Because condensation that collects inside the tubing interfere with accurate subsurface pressure measurements, the recorded vacuum at the TMP's varied considerably and may not be reliable indicators of the true subsurface vacuum pressure. Furthermore, since the air temperature in the tube (and therefore the air density) would be difficult to measure or estimate, the recorded subsurface pressure readings will be biased high by an unknown amount. For these reasons, the recorded subsurface pressure readings are not reported.

Temperatures (Subsurface/Wellhead):

- ▶ Thermocouples were installed at each TMP to monitor subsurface temperatures at depths of 2, 7, 12, 17, 22, 27, and 32 ft bgs. These temperatures were monitored daily by onsite personnel, as well as offsite personnel via a remote computer connection.
- ▶ A single thermocouple was used to monitor temperatures at each individual wellhead. Readings were recorded off of the computer monitor in the control room in degrees Celsius. These readings were used to calculate well vapor flows.
- ▶ Two temperature probes were attached to the PVC piping, one at the inlet and one at the outlet of the heat exchanger. These temperatures were monitored and recorded by onsite personnel. The readings were used to calculate vapor flow into and out of the heat exchanger.

Figure 2-5: SPH Average Vapor Recovery Flow versus Temperature



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3.0 SUMMARY OF EVENTS

This section summarizes the SPH test at AFP4, and describes the types of measurements that were collected to assess test performance.

3.1 Chronology of Events

SPH pilot study field activities were conducted over an eight-month period beginning with the drilling on 17 April 2000 and ending with the collection of post-test soil samples on 21 November 2000. The implementation of the SPH pilot study adhered strictly to the *Six-Phase Heating™ Pilot-Scale Test Work Plan, Sampling and Analysis Plan, and Health and Safety Plan* (Radian and CES, March 2000).

General site preparation/construction activities were completed from 17 April through 19 May 2000. During this time period, subsurface heating electrodes, temperature monitoring points (TMPs), and SVE wells were installed. In addition, vapor recovery piping was installed to connect the SVE wells in the test area to the existing treatment system operated by IT Corporation.

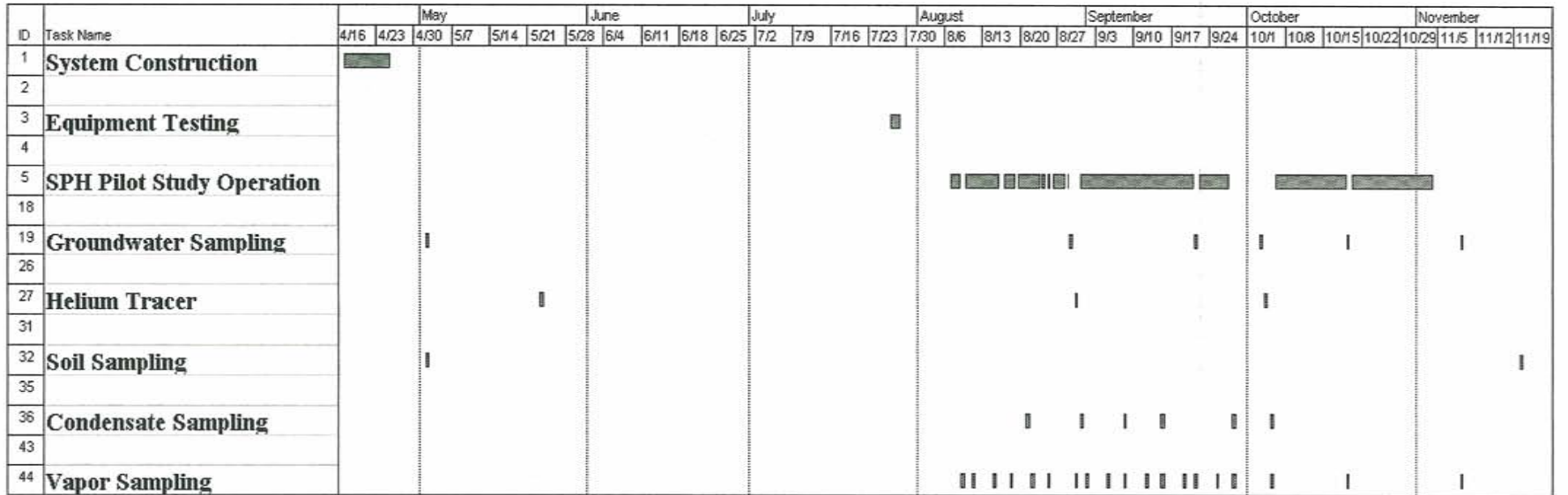
During the week of 24 July 2000, the SPH power supply was mobilized to the site and final installation activities were completed. SPH equipment was tested and safety interlocks were verified operational. Subsurface heating activities were completed over a 13-week time period from 7 August through 3 November 2000.

The test chronology is presented graphically in Figure 3-1. Note that the gaps in the system operation timeline represent system shutdowns, both planned and unplanned. Also note the approximately 3-month lag between the baseline soil and groundwater sampling and the start of heating. This delay was due to scheduling conflicts with SPH power supply. Considering the persistence of TCE in the AFP4 subsurface environment, this delay is considered to be insignificant when interpreting test TCE reductions. The overall system uptime during the SPH test was 96%, which is very good considering the number of equipment components and the required integration with the existing treatment facility.

3.2 Significant Events and System Modifications During Operation

Following are notable events and modifications made during the SPH test at AFP4.

**Figure 3-1
SPH Pilot Test Timeline**



3.2.1 Monitoring Well Voltage

During all SPH projects, voltage surveys are completed to ensure the safety of site personnel. A voltage survey consists of checking the voltage potential between objects within reach of each other where a person's body could serve as an electrical pathway. CES has adopted a standard of 15 volts to ensure public safety; OSHA considers 30 volts to be acceptable.

Because the groundwater monitoring wells were constructed of stainless steel, a point source electrical potential was brought to the surface as anticipated during SPH design. This induced voltage was verified during startup testing and rectified before operating the system in unattended operation. To address this effect, each monitoring well was electrically insulated so they could not be touched and high voltage signs were placed on each well (9 August 2000) to warn groundwater samplers that SPH system lock-out was required before water sampling.

3.2.2 Vapor Treatment System

During SPH operations, steam and contaminants in the subsurface are recovered using soil vapor extraction. To ensure that vapor capture was maintained during the heating process and to minimize the possibility of steam migration during SVE shutdown, the vapor treatment system and SPH power supply were interlocked such that a vapor treatment shutdown would cause SPH operations to cease. When the SPH system is shut down, the generation of steam stops instantly.

IT Corporation experienced operational problems with the vapor treatment system that resulted in SPH downtime. In all, there were four shutdowns during the pilot study; three of which were corrected within 24 hours - 17 August (18 hours), 19 August (6 hours), and 5 October (20 hours).

The only shutdown resulting in extended downtime occurred from 25 through 29 August 2000 when a component in the catalytic oxidizer failed. IT Corporation immediately transferred the vapor treatment system to an activated carbon backup system. However, because the carbon backup was not intended for long-term vapor treatment, breakthrough occurred the following day. As a result, SPH operations remained down until 29 August when the catalytic oxidizer was repaired and the vapor treatment system was brought back online.

3.2.3 Transfer Pump

A transfer pump on the condenser skid failed, causing a high level condition in the condensate sump resulting in a shutdown of the vapor treatment system. Because the pump was

not self-priming, the pump could not overcome the vacuum from the vapor treatment system between pumping cycles and a high level condition occurred. This problem resulted in sporadic shutdowns of the vapor treatment system between 16 and 23 August 2000 when the problem was identified and corrected.

3.2.4 Electrical Curtailment

LM Aero entered into an agreement with the local utility such that, during periods of peak energy demand, they would curtail their electrical demand or pay a premium for consumption during the curtailment period. The electrical curtailment program began on 23 August 2000. During a three-week time period lasting from 24 August through 12 September 2000, CES received daily electrical curtailment requests that typically lasted from 2:00 PM through 6:00 PM. In all, electrical curtailment caused about 4 days of downtime in order to reduce electrical usage charges.

3.2.5 Electrodes

On 7 September and 13 September 2000, amendments were made to electrodes E1, E2, and E4 because the deep electrode segments had failed. Installing additional electrical conductors immediately adjacent to the existing electrode corrected this failure.

CES reviewed the original design and installation details to determine why three of the deep electrode segments failed. It appears that the technique used to couple the electrode wetting system to the electrode may have been the cause. During installation, the electrode wetting system was attached such that water dripped on the bolted electrode connection. As a result, cool water caused the hot bolt to contract and fail due to thermal shock. This problem has been corrected in subsequent electrode designs.

3.2.6 SPH Power Supply

On 27 September 2000, CES experienced a SPH power supply shutdown. The shutdown was caused by the malfunction of a component used to regulate the applied voltage to the SPH array. Internal protective circuitry prevented the system from operating until the problem was corrected. Subsurface heating operations remained shut down until October 3rd when the power supply was repaired.

3.3 Systems Measurements

Table 3-1 lists the various types and frequencies of measurements collected during the SPH test to assess technology performance. Table 3-2 provides the types and timing of test samples collected for laboratory analyses.

3.4 Quality Control/Quality Assurance

A review of the quality control (QC) data for the analytical measurements was performed to determine the usability and defensibility of the AFP4 SPH pilot-test chemical measurement data. Samples in air, water, and soil were collected and analyzed for volatile organic compounds (VOCs). Water samples were also analyzed for chloride and total organic carbon. Complete AFP4 SPH analytical data tables are contained in Appendix D.

The review focused on laboratory blanks, matrix spikes, surrogate recoveries, and laboratory control samples (LCSs). The data indicate that the QC mechanisms were effective in ensuring measurement data reliability within the expected limits of sampling and analytical error. Overall, QC data associated with this program indicate that measurement data are acceptable and defensible. Results without problems are not discussed in this summary. However, there were concerns identified during the quality assurance/quality control (QA/QC) review that should be noted prior to final interpretation of the analytical results. These concerns are briefly discussed below.

The first concern related to method blank results for VOCs in soil. In two of the method blanks, methylene chloride, a common lab contaminant, was detected below the detection limit. No data were qualified because these results were below the detection limit.

The second concern related to groundwater sample AFP4-SPH-GW11-0. Three vials were sent for MS/MSD analysis. The parent sample contained a result for trichloroethene that was significantly over the calibration range. The spike amount is insignificant when compared to the parent sample. There was not enough sample to reanalyze the MS/MSD at an appropriate dilution; therefore, this MS/MSD could not be evaluated. The parent sample was diluted and reported within the calibration range. The LCS/LCSD recoveries were within acceptance criteria. A reanalysis of the parent was performed out of the first vial that contained headspace. The results appeared to match the initial run, but could be biased low.

Table 3-1
SPH Sample and Measurement Location and Frequency

| Measurement or Sampling Event | Location | Method | Frequency ⁽¹⁾ | Objective and Reporting Format |
|---|---------------------------------------|---------------------------|--------------------------|---|
| Vacuum: In the vadose zone | At SVE wells and pressure piezometers | Vacuum gauge | 1 | Verify vadose zone vacuum – Inches of Mercury (in. Hg) |
| Inlet of the SPH condenser | 1 point | Vacuum gauge | 1, 2 | System check for condenser fouling - in. Hg |
| Outlet of the SPH condenser | 1 point | Vacuum gauge | 1, 2, 3 | Data to calculate VOC removal rate and totals - in. Hg |
| Vapor Recovery: In the vadose zone | At pressure piezometers | Mark 9822 Helium Detector | 6 | Verify vapor recovery via helium tracer recovery testing – % helium |
| Temperature: 28 Subsurface temperatures | 4 TMPs | Type T Thermocouple | 5 | Track remediation performance- Degree Centigrade (°C) |
| In SVE main header | 1 point | Type T Thermocouple | 5 | Track remediation performance - °C |
| SPH condenser inlet | 1 point | Thermometer | 1, 2 | Systems operations check – °C |
| SPH condenser outlet | 1 point | Thermometer | 1, 2 | Systems operations check – °C |
| After SVE Blower | 1 point | Thermometer | 1, 2 | Systems operations check – °C |
| Air Flow: After SPH condenser | 1 point | Pitot Tube ⁽²⁾ | 1, 2, 3, 4 | VOC removal rate – Standard cubic feet per minute (scfm) |
| Water Flow: Waste condensate discharge | 1 point | Totalizer | 5 | Volume of waste condensate produced - gallons per minute (gpm) |
| VOC Sampling: After the SPH condenser | 1 point | SUMMA canister | 7 | VOC removal rate and totals – milligram per liter (mg/l) |
| Condensate at condenser discharge | 1 point | VOA vial | 8 | Determination of condensate VOC concentrations – mg/l |
| Groundwater monitoring wells ⁽³⁾ | 10 wells | Peristaltic pump | 9 | Track progress of study – VOCs in microgram per liter (µg/l) |
| Subsurface soils ⁽⁴⁾ | 3 borings | En Core sampler | 10 | Track progress of study – VOCs in microgram per kilogram (µg/kg) |

Notes:

1. 1 = During system startup, then as necessary
2 = As necessary
3 = While performing sampling for inlet VOC concentrations
4 = While performing sampling for vapor abatement system efficiency
5 = Continuous
6 = Before system startup, after week 4, and during week 9
7 = Approximately 2 per week of heating
8 = Approximately 1 per week of condensate production
9 = Before system startup, during weeks 3, 6, 8, and 10, and following system shutdown
10 = Before system startup and following system shutdown
2. Pilot tubes are read with water filled manometers
3. Groundwater was sampled with a TFE bailer, raised to within 15 feet of the surface and then the water is removed from the bailer by peristaltic pump and is cooled in the sampling lines prior to collection in VOA vials.
4. Subsurface soil samples were collected from the borings for TMP1, TMP2, & TMP3 pre-test, and from boreholes located within 3 ft of these borings post-test.

Table 3-2
SPH Detailed Analytical Sampling Schedule ⁽¹⁾

| Week of Operations | Groundwater 10 Wells (EPA Method 8260) | Groundwater 10 Wells (EPA Method 300) | Groundwater 10 Wells (EPA Method 415.1) | Soil 3 Boreholes (EPA Method 8260) | Vapor System Outlet (EPA Method TO-14) | Condensate Discharge (EPA Method 624) | Investigation-Derived Waste (EPA Method 1311) |
|--------------------|---|--|--|---------------------------------------|---|--|--|
| | Number of Samples | | | | | | |
| Pre-test | 10 | 10 | | 15 | 1 | | 2 |
| 1 | | | | | 2 | | |
| 2 | | | | | 2 | | |
| 3 | 3 | | | | 2 | | |
| 4 | | | | | 2 | 2 | |
| 5 | | | | | 2 | 2 | |
| 6 | 3 | 3 | | | 2 | 2 | |
| 7 | | | | | 2 | 1 | |
| 8 | 10 | | | | 2 | 2 | |
| 9 | | | | | 1 | 1 | |
| 10 | 10 | | | | | | |
| 11 | | | | | 1 | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| Post-test | 10 | 10 | 10 | 15 | 1 | | |
| Totals | 46 | 23 | 10 | 30 | 20 | 10 | 2 |

Note:

- (1) Method 8260 = volatile organic analysis
Method 300 = chloride analysis
Method 415.1 = total organic carbon analysis
Method TO-14 = volatile organic analysis
Method 624 = volatile organic analysis
Method 1311 = toxicity characteristic leaching analysis

The third concern related to the analysis of trip blank AFP4-SPH-GW11-6. The sample had a pH of 7 and was analyzed one day out of hold time for unpreserved samples. The data for this sample are not qualified. Although TCE was reported in the trip blank, it was detected in the associated field samples at several hundred times the concentration in the trip blank. Therefore, data assessment is not effected.

The fourth concern related to LCS/LCSD precision in air samples. LCS/LCSD recoveries for styrene were above tolerance in several batches. The high recovery is probably due to degradation of this compound in the initial calibration standard. Styrene was not detected in the field samples; therefore, the high bias does not affect data quality.

The fifth concern related to the precision of analytical duplicates for air samples. Benzene and styrene at low concentrations did not have acceptable precision in many of the analyses. High variability at these concentrations is not unexpected, and these compounds are not constituents of primary concern for this project.

The field duplicate result for trichloroethene in soil for sample AFP4-SPH-S006 was not repeatable. No data were qualified based upon one result.

The last concern is related to the analysis of soil sample AFP4-SPH-S032-0. This sample was analyzed three times. In the first analysis, an Encore sample vial was analyzed and trichloroethene was over the calibration range of the instrument. The second Encore vial was opened and a 1g sample was removed and analyzed. (This functioned as a 1:5 dilution.) The results for this analysis were also over the calibration range of the instrument. At this time, there were no more Encore samples for analysis. The laboratory personnel then analyzed the frozen spare jar for trichloroethene. In this analysis, the sample did not have to be diluted and the results were much lower than the first two analyses. The two samples from the Encores agree with each other. The analysis from the spare jar is biased low. These results validate the EPA theory that volatile samples stored in jars may be biased low. The second Encore result was selected as the sample concentration most representative of conditions at the site, even though the concentration has been qualified as estimated and is probably higher than that reported in the data summary.

In addition the QA/QC review of the analytical data, a laboratory audit was performed prior to the field program. A URS QC officer audited the Severn Trent Laboratory (STL) in Austin, Texas. STL performed the analysis of all AFP4 SPH samples. A copy of the audit

report is contained in Appendix E. Overall, the laboratory equipment and operations were found to be in good working order and acceptable for the required analysis.

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4.0 TREATMENT SYSTEM PERFORMANCE

The following discussion focuses on how well the SPH technology performed relative to the three performance objectives.

4.1 Subsurface Temperatures Results

The first objective of the SPH pilot scale test was to heat the subsurface to the boiling point of TCE at depth (73 degrees Centigrade, or °C). Subsurface temperature was monitored at four temperature monitoring points (TMPs) within the treatment array. Each TMP contained seven thermocouples spaced at 5-foot intervals to measure temperatures at discrete depths ranging from two to twenty-seven feet below grade. Subsurface temperature data is presented graphically in Figures 4-1 and 4-2, which depict the temperature versus depth and temperature versus time charts, respectively, for the four TMPs. The site average charts for these parameters are provided in Figure 4-3.

Subsurface temperature data indicate that 21 of 24 thermocouples reached the boiling point of TCE. Of the three thermocouples that did not meet the heating objective, two were shallow thermocouples in TMP1 (65 and 70°C), and the other was a deep thermocouple in TMP2 (55 °C). Although these thermocouples did not reach the heating objective, soil analytical data indicate that cleanup objectives were achieved in these areas. Additionally, the temperature data indicate that 14 of 24 thermocouples reached the boiling point of water.

4.1.1 Subsurface Temperature versus Depth

Figure 4-1 present plots of the subsurface temperature profile with depth for each of the four TMPs. Each line represents a set of temperature data. The two vertical lines represent the boiling point of TCE and the boiling point of water, and the horizontal line represents the average depth to groundwater during the pilot test.

Temperature data from the thermocouples located two-feet below grade are above the design heating interval; they were sentinel locations used to evaluate shallow vapor capture. Relatively cool temperatures at this depth indicate that cool surface air was being drawn down through these soils and that steam with TCE vapors was not moving up into the floor backfill. Temperature data at two-feet below grade were not used in calculations of average temperature at the site.

These plots show the temperature profile during initial heating as well as equilibrium conditions toward the end of the pilot test. In general, from left to right, the temperature profiles show steady, uniform increase in temperature.

Subsurface temperatures measured in the shallow regions of the treatment volume (i.e., less than 15 ft bgs) are reduced by evaporative cooling from cool air that is drawn into the treatment zone by the SVE system; temperatures at the bottom of the treatment volume are influenced by conductive heat losses. Although evaporative cooling retarded shallow soil temperatures, this is not a detrimental effect. After all, evaporation is the entire goal of SPH. The amount of evaporative cooling is a consequence of the relatively high vapor extraction rates in the pilot test area. One deep thermocouple (TMP2-32') did not reach the boiling temperature of TCE. This is probably a result of thermal conduction down into bedrock in conjunction with the failure of the three deep electrodes as described in Section 2.

Temperature data contained in these plots provide strong evidence of electrical resistive heating. Site geology is heterogeneous, with interbedded layers of silt, clay, and poorly sorted sand/gravel. In this geologic setting, steam heating would result in narrow regions of increasing temperature located in the most permeable geologic units; not the wide band of heating that is observed in the center of the treatment volume. Subsurface temperature data indicate steady, uniform heating in the center of the treatment volume that is influenced at the boundaries by evaporative cooling from the SVE system and conductive losses at depth.

4.1.2 Subsurface Temperature versus Time

Figure 4-2 presents subsurface temperature data over time at each TMP locations. Each line represents a data set from a specific locations. In all, four subsurface temperature data sets are presented on each graph: shallow temperature (7 feet), deep temperature (27 feet), average temperature, and the overall site average temperature. Based on the temperature data, it appears that boiling began around day 20; however, temperature increases were observed until day 40.

These plots provide an effective means of comparing heating at specific depths of the TMP with respect to the average as well as the entire site. Temperature data indicate steady, uniform heating. When comparing data collected from shallow and deep regions to the average temperature for the TMP, the variability is typically less than 10°C. In addition, the average temperature for each TMP is generally within 10°C of the overall site average.

Figure 4-1
SPH Temperature vs. Depth Plots

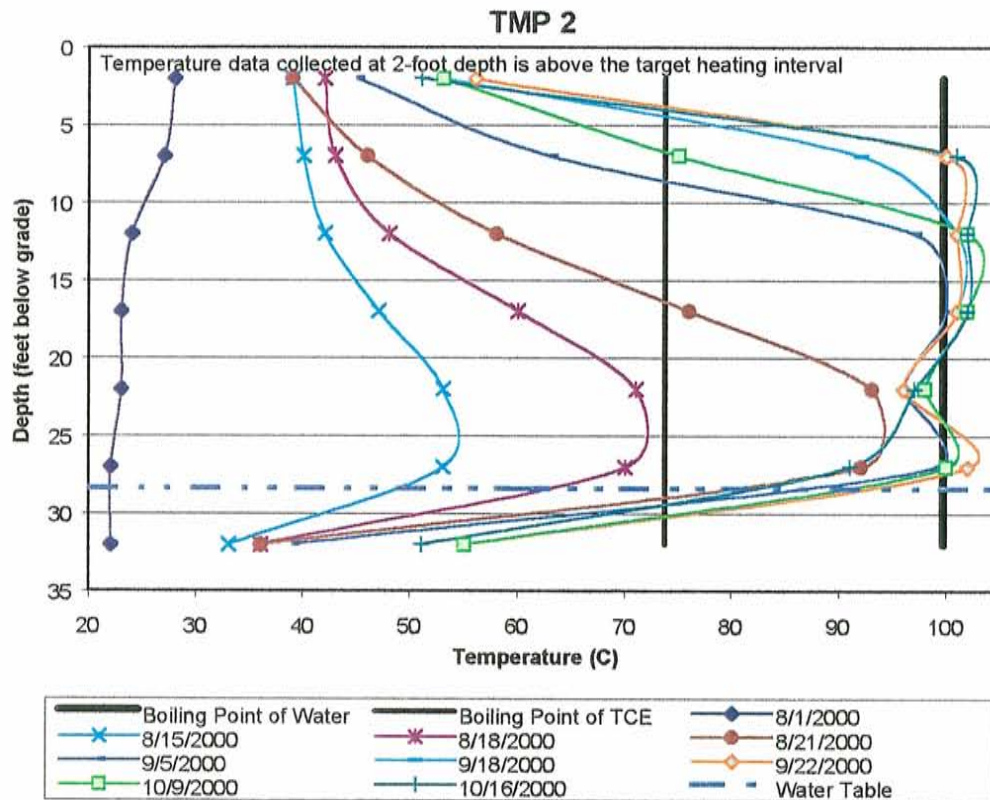
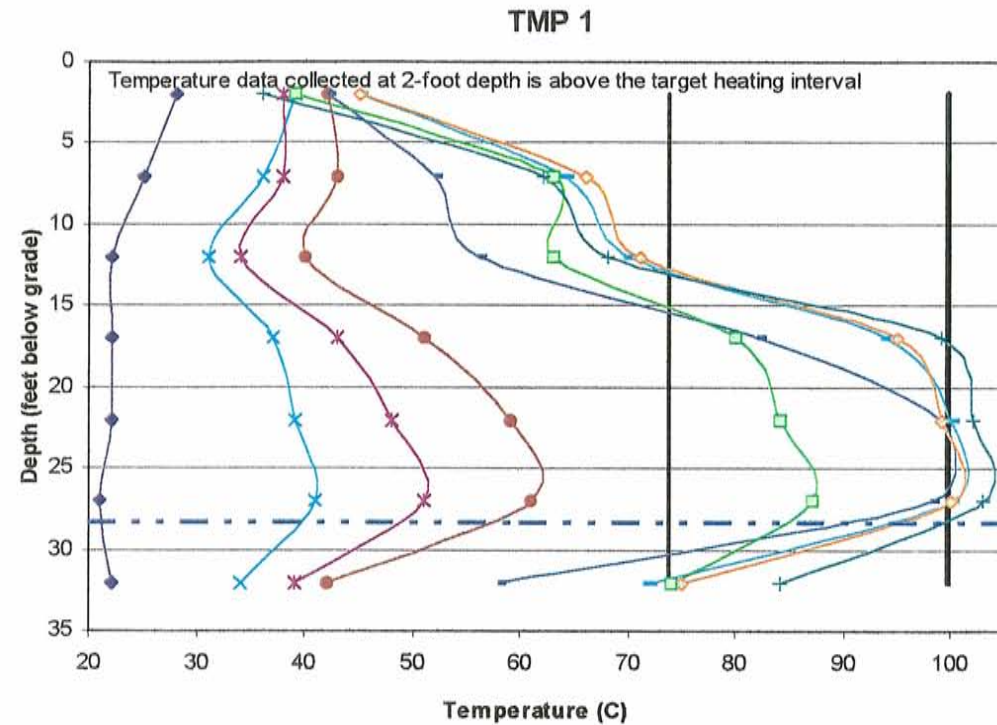


Figure 4-1
SPH Temperature vs. Depth Plots (Continuation)

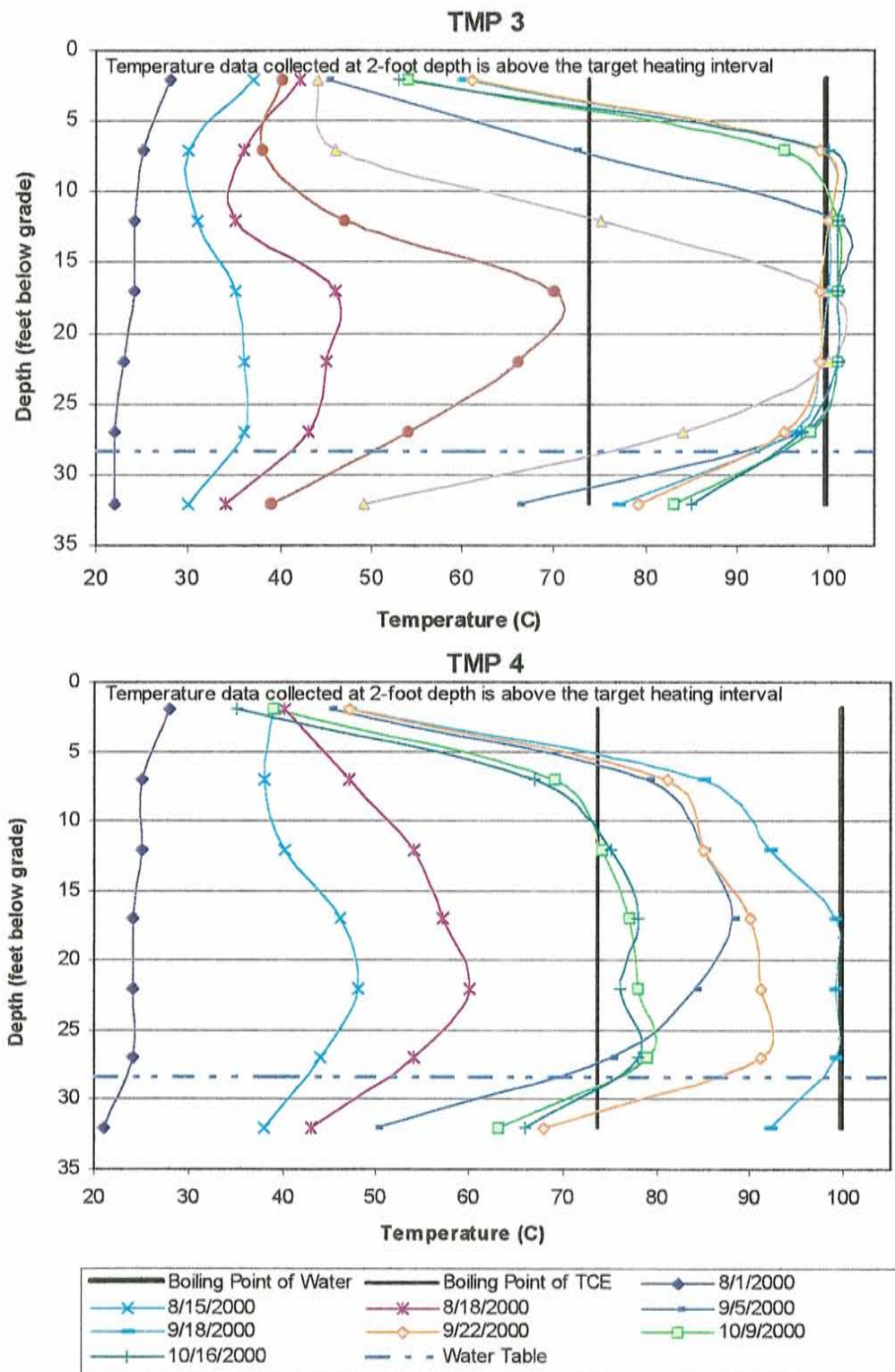


Figure 4-2
SPH Temperature vs. Time Plots

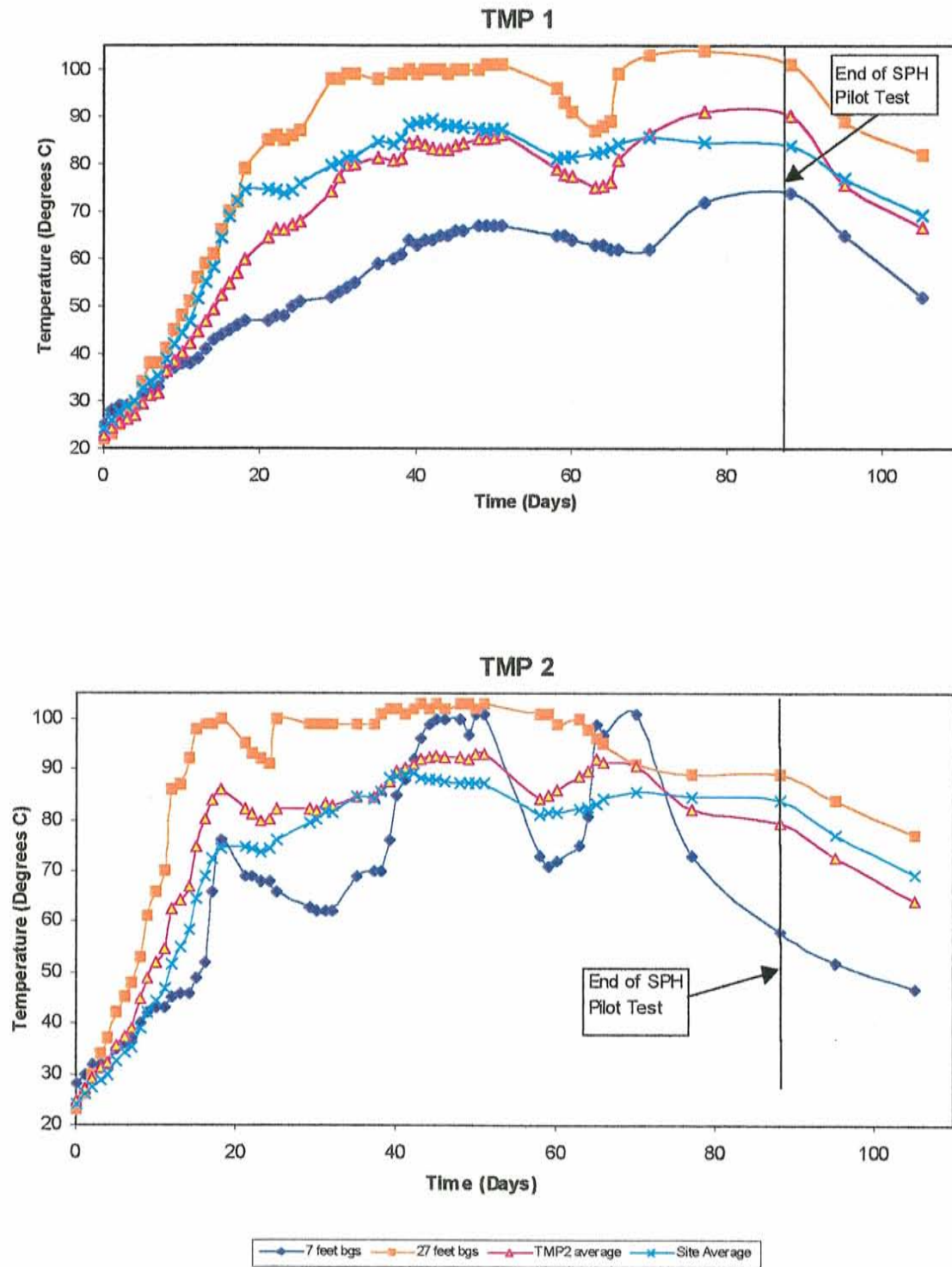


Figure 4-2
SPH Temperature vs. Time Plots (Continuation)

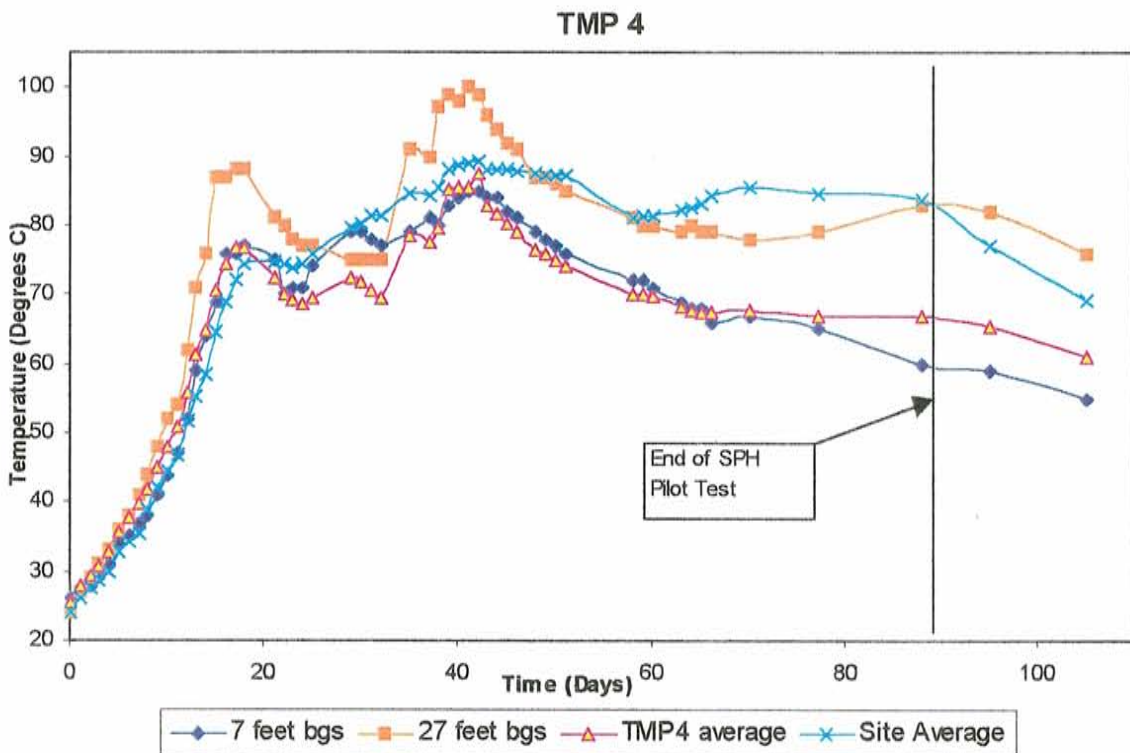
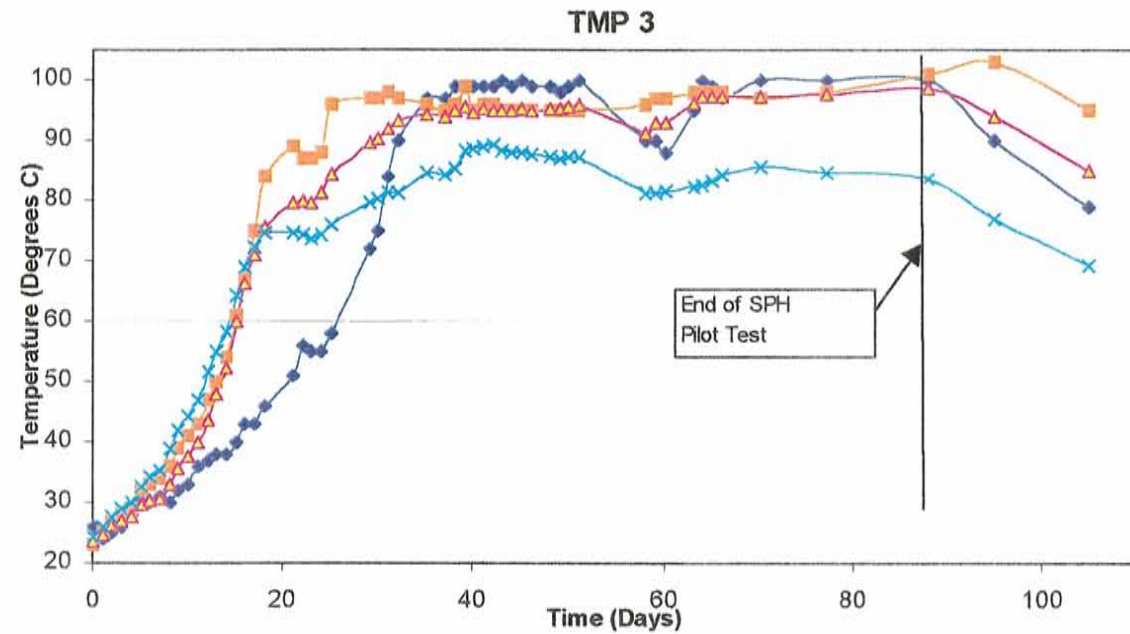
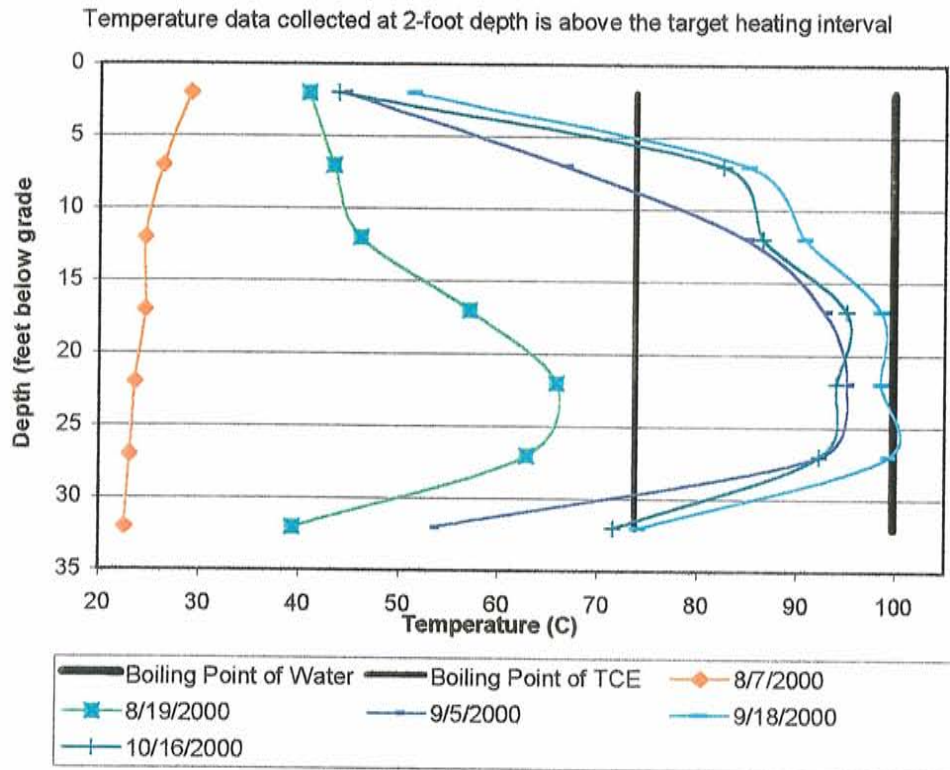
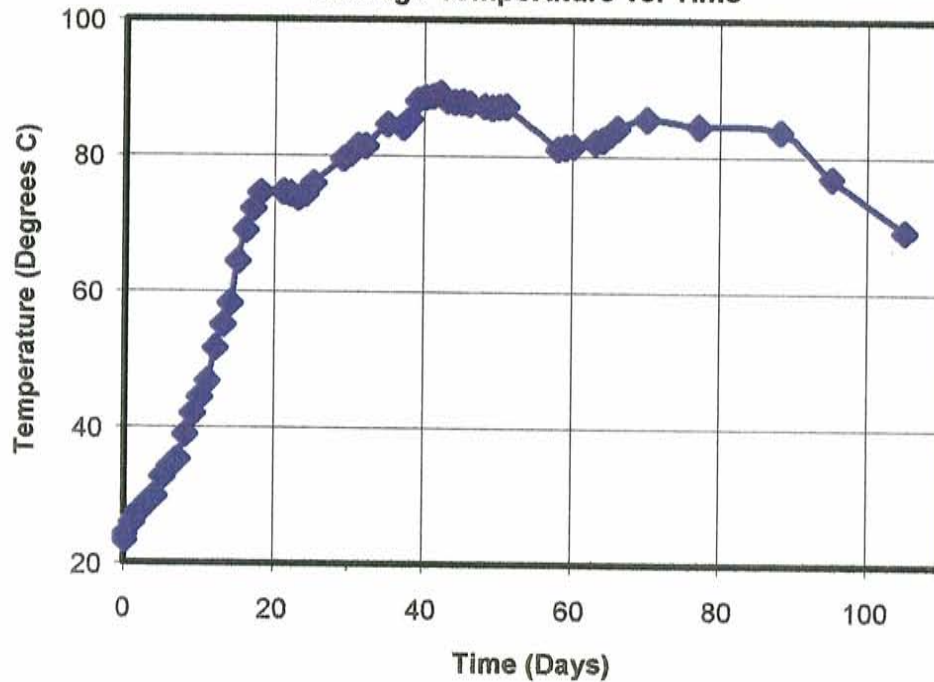


Figure 4-3
SPH Average Temperature vs. Depth and Time

Average Temperature vs. Depth



Average Temperature vs. Time



Another trend that is apparent when reviewing these plots is that the shallow regions of the treatment cell were slower to heat. Evaporative cooling from the SVE system caused this effect.

4.2 Groundwater Results

Determination of “effectiveness” for SPH, for both groundwater and soils, is based on statistical analysis of pre- and post-test analytical results. Statistical criteria used consists of the following:

1. Comparing the Upper Confidence Limit (UCL) of the pre- and post-remediation test site data to the appropriate “threshold”; and
2. Determining whether the average TCE concentrations at the test site have been reduced by a statistically significant amount.

The PTRG (threshold) identified for the pilot test was 10 mg/L TCE in groundwater. This level was taken from the existing ROD.

As seen in Table 4-1, the pre-test average and 95% UCL concentrations were 73.4 and 129 mg/L respectively. The average and 95% UCL of the post-test data are concentrations of 3.63 and 5.69 mg/L TCE, respectively. Both post-test results are well below the remedial threshold. Compared with pre-test analytical results, the calculated removal efficiencies using average and 95% UCL data were 95 and 96%, respectively.

Table 4-2 shows how the groundwater results conform to the statistical evaluation table, being defined as “*SPH is effective*”. The groundwater analytical data is presented graphically, using a logarithmic scale, in Figure 4-4.

Individual groundwater analytical results (Table 4-1) indicate that SPH was able to reduce individual TCE concentrations below 10 mg/L in all of the 10 wells except WJETA062 (10.7 mg/L TCE in post-test measurement). This well had previously shown a reduction in concentration to as low as 0.166 mg/L, and had been below the threshold since the sampling round completed during Week 3 of the pilot test on 8/29/00. Overall, TCE concentrations in this well were reduced by 69% during the SPH test.

Table 4-1
AFP4 SPH Groundwater Sampling Results

| Well ID | TCE Concentration (mg/L) | | | | | | % Reduction |
|------------------|--------------------------|---------------------|---------------------|---------------------|-----------------------|------------------------|-------------|
| | Baseline (5/2/00) | 3-Week (8/29/00) | 6-Week (9/21/00) | 8-Week (10/3/00) | 10-Week (10/19/00) | Post-Test (11/9/00) | |
| WJETA058 | 209[5000] | | | 30.9[500] | 0.298[10] | 0.917[20] | 100 |
| WJETA059 | 9.17[1000] | | | 8.03[100] | 6.78[200] | 8.77[100] | 4 |
| WJETA060 | 5.96[100] | | | 9.49[100] | 5.87[200] | 4.37[100] | 27 |
| WJETA061 | 41.5[1000] | | | 10.6[100] | 7.17[100] | 4.34[100] | 90 |
| WJETA062 | 34.3[1000] | 3.75[100] | 0.166[5] | 9.36[100] | 0.206[10] | 10.7[500] | 69 |
| WJETA063 | 19.7[500] | | | 1.74[20] | 0.010[1] | 1.48[20] | 92 |
| WJETA064 | 38.9[1000] | | | 0.677[20] | 0.425[20] | 0.272[5] | 99 |
| WJETA065 | 81.8[2000] | 21.9[1000] | 1.40[20] | 4.12[100] | 1.06[20] | 0.520[10] | 99 |
| WJETA066 | 9.13[100] | | | 6.19[100] | 3.22[50] | 3.06[100] | 66 |
| WJETA067 | 285[5000] | 9.27[1000] | 0.296[10] | 24.9[500] | 0.553[20] | 1.90[100] | 99 |
| Average | 73.4 | | | 10.6 | 2.56 | 3.63 | 95 |
| UCL (95%) | 129 | | | 16.3 | 4.27 | 5.69 | 96 |

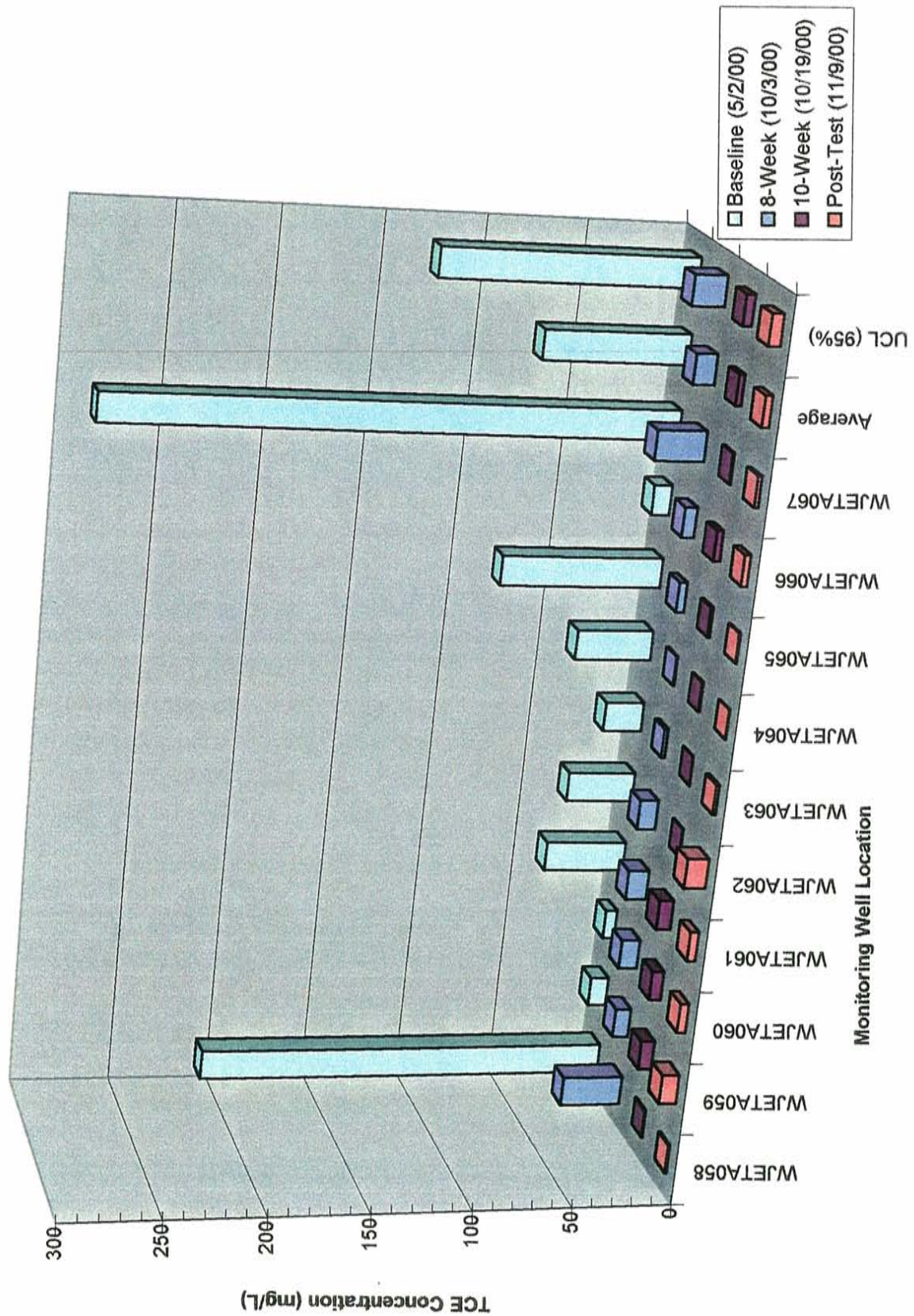
Notes:

- (1) Test heating began on August 7 and ended on 2 November 2000.
- (2) The baseline TCE result for well WJETA065 is an average of the normal and duplicate sample results (81.0 & 82.6 mg/L).
- (3) The 8-week TCE result for well WJETA067 is an average of the normal and duplicate sample results (32.7 & 17.5 mg/L).
- (4) The 10-week TCE result for well WJETA058 is an average of the normal and duplicate sample results (0.298 & 0.299 mg/L).
- (5) The post-test TCE result for well WJETA059 is an average of the normal and duplicate sample results (7.22 & 9.62 mg/L).
- (6) Dilution factors are in brackets next to each sample result.

Table 4-2
SPH Groundwater Statistical Evaluation Results

| | | Comparison of UCLs to Threshold | | | |
|-------------------------|---|---|--|---|--|
| | | Post-treatment UCL < Threshold | | Post-treatment UCL > Threshold | |
| | | Pre-treatment UCL < Threshold | Pre-treatment UCL > Threshold | Pre-treatment UCL < Threshold | Pre-treatment UCL > Threshold |
| Means Comparison | Post-treatment mean < Pre-treatment mean (statistical significance) | <i>SPH effective even at low initial concentrations of TCE</i> | SPH is effective | <i>Re-evaluate statistical computations</i> | <i>SPH parameters may need adjustment, but remediation still effective</i> |
| | Post-treatment mean = Pre-treatment mean (no statistical significance) | <i>No apparent effect of SPH at low initial concentrations of TCE</i> | <i>Some evidence to indicate SPH effectiveness</i> | <i>SPH is not effective at reducing TCE</i> | <i>SPH is not effective at reducing TCE</i> |

Figure 4-4. TCE Concentrations in Groundwater



4.3 Soil Results

The PTRG (threshold) identified for the SPH pilot test was 11.5 mg/kg in soil. This level was taken from the existing ROD, and is based on previous modeling performed to determine a vadose zone concentration that would be protective of groundwater.

As seen in Table 4-3, the pre-test average and 95% UCL concentrations were 3.41 and 8.40 mg/kg, respectively. The average and 95% UCL of the post-test data are concentrations of 0.157 and 0.286 mg/kg TCE, respectively. Both results are well below the remedial threshold. Compared with pre-test analytical results, the calculated removal efficiencies using average and 95%UCL data were 95 and 97%, respectively.

Table 4-4 shows how the soil results conform to the statistical evaluation table—being defined as “*SPH effective even at low initial concentrations of TCE*”. This is a result of the pre-test 95% UCL being less than the 11.5 mg/kg threshold concentration. In fact, only one of the 15 pre-test soil samples had a TCE concentration greater than 11.5 mg/kg. (Historically this degree of variability in TCE source area concentrations is not uncommon.) The duplicate soil sample results from the 4 to 6 feet bgs interval at TMP1 were concentrations of 18.3 and 67.6 mg/kg (both >11.5 mg/kg), and the average of these values (42.9 mg/kg) was used in the statistical comparisons. Duplicate samples were also collected at this location and depth in the post-test sampling, and the average of these results (0.342 mg/kg) shows a 99.2% reduction in TCE concentrations. So although by statistical evaluation criteria SPH was deemed effective for soils at low initial concentrations of TCE, results from the sole data point with pre-test concentrations greater than the threshold suggest it was also effective at treating high initial concentrations. The soil analytical data is presented graphically, using a logarithmic scale, in Figure 4-5.

4.4 Overall Removal Efficiency

Vapor recovery and treatment was accomplished using the existing vapor treatment system located outside Building 181, operated by IT Corporation. CES provided and installed a condenser to remove condensable water vapor from the recovered vapor stream. The existing catalytic oxidizer and scrubber were used to treat the remaining vapor stream prior to discharge to the atmosphere. Condensate was pumped to a holding tank where it was batch fed through an existing air stripper with granular activated carbon polish prior to discharge to the local POTW.

Table 4-3
AFP4 SPH Soil Sampling Results

| Location ID | Sample Depth (ft) | Pre-Test TCE Conc. (mg/kg) | Pre-Test Comparison Conc. (mg/kg) | Post-Test TCE Conc. (mg/kg) | Post-Test Comparison Conc. (mg/kg) | % Difference |
|-------------|-------------------|----------------------------|-----------------------------------|-----------------------------|------------------------------------|--------------|
| TMP3 | 2-4 | 0.277J[100] | 0.277 | ≤ 0.0005[1] | 0.0002 | 99.91 |
| TMP3 | 6-8 | 0.138J[100] | 0.138 | ≤ 0.0005[1] | 0.0002 | 99.83 |
| TMP3 | 24-26 | ≤ 0.001[1] | 0.0005 | ≤ 0.0005[1] | 0.0002 | 53.20 |
| TMP3 | 28-30 | 0.371J[100] | 0.371 | 0.932ER[1] | 0.932 | -151.21 |
| TMP3 | 30-32 | 1.20[100] | 1.20 | 1.01ER[1] 0.288ER[1] | 0.649 | 45.92 |
| TMP1 | 4-6 | 18.3 [100] 67.6[1000] | 42.9 | 0.269ER[1] 0.415ER[1] | 0.342 | 99.20 |
| TMP1 | 6-8 | ≤ 0.001[1] | 0.0005 | 0.130[1] | 0.130 | -22908.85 |
| TMP1 | 14-16 | ≤ 0.001[1] | 0.0006 | ≤ 0.0004[1] | 0.0002 | 65.96 |
| TMP1 | 24-26 | ≤ 0.001[1] | 0.0006 | ≤ 0.0004[1] | 0.0002 | 60.89 |
| TMP1 | 30-32 | 1.93[100] | 1.93 | 0.262ER[1] | 0.262 | 86.42 |
| TMP2 | 2-4 | ≤ 0.004 [1] | 0.0002 | ≤ 0.0004[1] | 0.0002 | 6.36 |
| TMP2 | 4-6 | 3.89[100] | 3.89 | 0.038[1] | 0.038 | 99.02 |
| TMP2 | 10-12 | 0.251J[100] | 0.251 | ≤ 0.0006[1] | 0.0003 | 99.89 |
| TMP2 | 12-14 | ≤ 0.004[1] | 0.0002 | ≤ 0.0004[1] | 0.0002 | -5.73 |
| TMP2 | 16-18 | 0.095[100] | 0.095 | ≤ 0.0004[1] | 0.0002 | 99.79 |
| | | Average | 3.41 | Average | 0.157 | 95 |
| | | UCL | 8.40 | UCL | 0.286 | 97 |

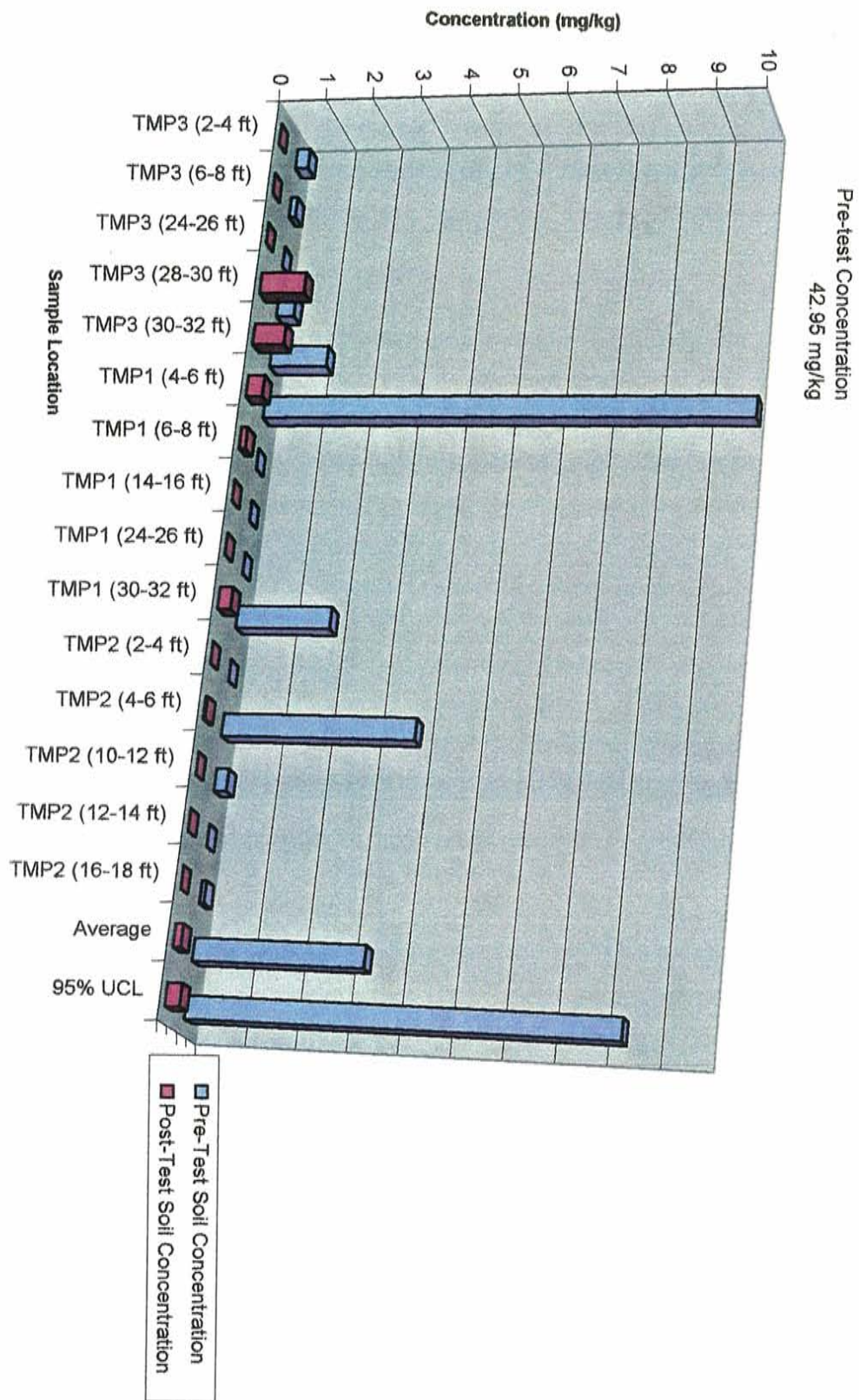
Notes:

- (1) Where duplicate sample results exist, the result used in the statistical evaluation is an average of the normal and duplicate sample results. These are shown in the table as the pre- and post-test samples at TMP1 (4-6 ft) and the post-test sample from TMP3 (30-32 ft).
- (2) For statistical evaluation, a non-detect (ND) result is considered to be one-half the detection limit value.
- (3) E = analyte concentration exceeded calibration range; R = result reported elsewhere; J = result > or = MDL and <PQL.
- (4) The "ER" flagged data were used in the statistical analyses because subsequent analyses performed on frozen, backup Encore samples resulted in lower TCE concentrations and are believed to be biased low.
- (5) Dilution factors are in brackets next to each sample result.

Table 4-4
SPH Soil Statistical Evaluation Results

| | | Comparison of UCLs to Threshold | | | |
|-------------------------|--|---|--|---|--|
| | | Post-treatment UCL <Threshold | | Post-treatment UCL >Threshold | |
| | | Pre-treatment UCL <Threshold | Pre-treatment UCL >Threshold | Pre-treatment UCL <Threshold | Pre-treatment UCL >Threshold |
| Means Comparison | Post-treatment mean < Pre-treatment mean (statistical significance) | <i>SPH effective even at low initial concentrations of TCE</i> | <i>SPH is effective</i> | <i>Re-evaluate statistical computations</i> | <i>SPH parameters may need adjustment, but remediation still effective</i> |
| | Post-treatment mean = Pre-treatment mean (no statistical significance) | <i>No apparent effect of SPH at low initial concentrations of TCE</i> | <i>Some evidence to indicate SPH effectiveness</i> | <i>SPH is not effective at reducing TCE</i> | <i>SPH is not effective at reducing TCE</i> |

Figure 4-5. TCE Concentrations in Soil



Vapor flow rate and concentration data were collected after the condenser. Measured vapor flow rates ranged from about 55 to 120 SCFM at applied vacuum ranging from 5.7 to 8.3 inches of mercury. Peak TCE recovery occurred on 12 September 2000 (day 36) at 11.7 pounds per day. Approximately 330 pounds of TCE were recovered during the 88-day pilot test.

A total of 47,434 gallons of condensate was recovered during the pilot test with a peak recovery rate of about 810 gallons per day. The peak condensate TCE concentration during the test was 1.4 mg/L. Based on the total condensate recovered and the maximum TCE concentration, the total recovered mass in the condensate was less than 0.6 pounds. Vapor phase extraction and treatment accounted for 99.8% of the TCE removed during the pilot test; less than 0.2% was removed as TCE dissolved in condensate. Table 4-5 shows the influent (pre-air stripper) and effluent (post-air stripper) concentration of TCE from condensate samples.

Table 4-5
Concentration of TCE in Condensate Samples

| Sample Round | Influent Concentration of TCE (µg/L) | Effluent Concentration of TCE (µg/L) |
|---------------------|---|---|
| 1 | ND | ND |
| 2 | 140 | ND |
| 3 | 380 | ND |
| 4 | 1100 | ND |
| 5 | 1400 | ND |
| 6 | 840 | ND |
| 7 | 410 | ND |

The SPH Site Log, which contains many of the operational parameters, is contained in Appendix F. Table 4-6 presents the measured and interpolated concentrations of TCE in the vapor stream, the power input, and the vapor and condensate recovery rate data. Figure 4-6 presents a summary of the TCE extraction rate, condensate production, and subsurface temperatures during the SPH test. This graph shows some key features that are typical of the SPH process, which are discussed below.

Around day 18 the average subsurface temperature profile began to stabilize. This is the point where site boiling began and significant energy was input to convert water and TCE to vapor (latent heat of evaporation). TCE recovery and condensate production profiles mirror the effect; notice the dramatic increase in TCE recovery and condensate production around day 18.

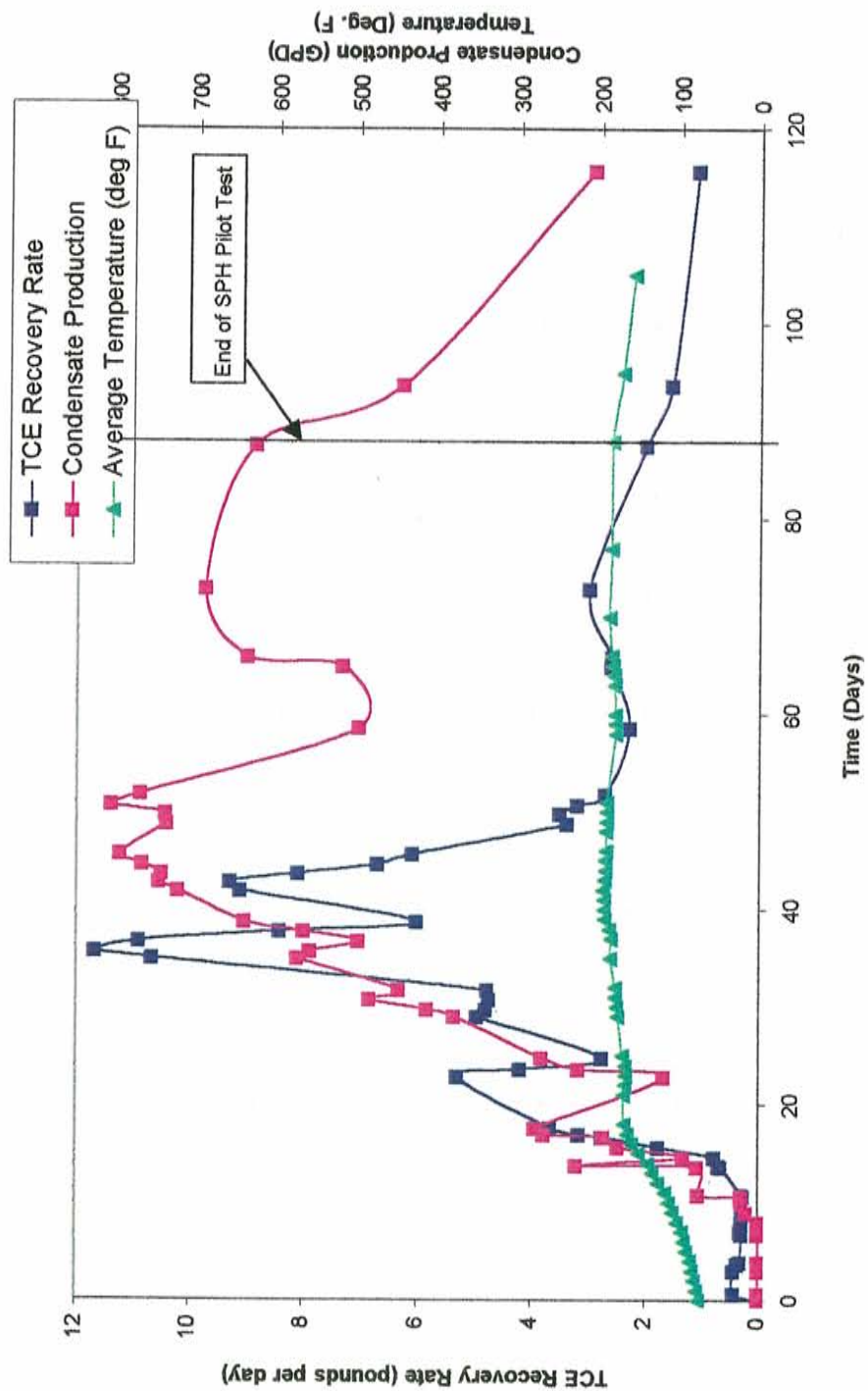
From day 18 to about day 40 limited temperature increases are observed, however, significant increases occur in both TCE recovery and condensate production. Because the

Table 4-6
SPH Power, Vapor and Condensate Summary

| Date | Time | Elapsed Time | SPH Data | | | | | Vapor Recovery Data | | | | | Steam Recovery | |
|----------|-------|--------------|----------------------------|--------------------|---------------------|----------------|--------------------------------|----------------------------|------------|----------------------|---------------|-------------------------|-----------------|---------------------|
| | | | Energy Input to Subsurface | Recent Power Input | Average Power Input | Blower Runtime | Incremental Runtime Efficiency | Average Runtime Efficiency | Vapor Flow | Vapor Conc. * | Recovery Rate | Cumulative VOC Recovery | Water Totalizer | Steam Recovery Rate |
| | | | (days) | (kW-hr) | (kW) | (hrs) | (%) | (%) | (SCFM) | (mg/m ³) | (lbs/day) | (lbs) | (gal) | (gal/day) |
| 07/27/00 | 15:40 | 0 | 0 | 0 | 0 | 0 | 0 | na | na | na | na | 0 | 0 | 0 |
| 08/01/00 | 12:45 | 0 | 0 | 0 | 0 | 0 | 0 | na | na | na | na | 0 | 0 | 0 |
| 08/07/00 | 15:50 | 0 | 0 | 0 | 0 | 0 | 0 | na | 119 | na | na | 0 | 0 | 0 |
| 08/08/00 | 9:30 | 1 | 8,733 | 494 | 494 | 18 | 100 | 100 | 119 | 40 | 0.4 | 0 | 0 | 0 |
| 08/10/00 | 17:30 | 3 | 24,166 | 276 | 276 | 74 | 100 | 100 | 119 | 40 | 0.4 | 1 | 0 | 0 |
| 08/11/00 | 9:20 | 4 | 28,352 | 264 | 273 | 90 | 100 | 100 | 120 | 34 | 0.4 | 1 | 0 | 0 |
| 08/11/00 | 14:30 | 4 | 29,718 | 264 | 273 | 95 | 100 | 100 | 104 | 34 | 0.3 | 1 | 0 | 0 |
| 08/14/00 | 11:45 | 7 | 49,448 | 285 | 278 | 164 | 100 | 100 | 91 | 35 | 0.3 | 2 | 0 | 0 |
| 08/14/00 | 17:30 | 7 | 50,543 | 190 | 275 | 170 | 100 | 100 | 100 | 35 | 0.3 | 2 | 0 | 0 |
| 08/15/00 | 9:00 | 8 | 55,701 | 333 | 280 | 185 | 100 | 100 | 94 | 35 | 0.3 | 2 | 0 | 0 |
| 08/15/00 | 17:00 | 8 | 58,157 | 307 | 282 | 193 | 100 | 100 | 94 | 35 | 0.3 | 2 | 0 | 0 |
| 08/16/00 | 15:15 | 9 | 64,281 | 275 | 281 | 215 | 100 | 100 | 93 | 34 | 0.3 | 3 | 14 | 15 |
| 08/17/00 | 14:45 | 10 | 67,051 | 118 | 264 | 220 | 20 | 92 | 97 | 33 | 0.3 | 3 | 34 | 20 |
| 08/18/00 | 8:45 | 11 | 73,406 | 353 | 270 | 238 | 100 | 93 | 93 | 32 | 0.3 | 3 | 50 | 22 |
| 08/18/00 | 11:15 | 11 | 74,313 | 363 | 271 | 241 | 100 | 93 | 93 | 34 | 0.3 | 3 | 58 | 75 |
| 08/21/00 | 8:15 | 14 | 90,161 | 230 | 262 | 310 | 100 | 94 | 93 | 80 | 0.7 | 5 | 276 | 76 |
| 08/21/00 | 11:15 | 14 | 90,838 | 226 | 262 | 313 | 100 | 94 | 95 | 82 | 0.7 | 5 | 305 | 227 |
| 08/22/00 | 8:00 | 15 | 98,166 | 353 | 267 | 333 | 100 | 95 | 91 | 96 | 0.8 | 6 | 386 | 94 |
| 08/23/00 | 8:30 | 16 | 105,277 | 290 | 269 | 358 | 100 | 95 | 83 | 239 | 1.8 | 8 | 565 | 175 |
| 08/24/00 | 8:20 | 17 | 112,591 | 307 | 271 | 382 | 100 | 95 | 81 | 378 | 2.8 | 10 | 757 | 193 |
| 08/24/00 | 14:45 | 17 | 114,509 | 299 | 272 | 388 | 100 | 95 | 85 | 415 | 3.2 | 11 | 829 | 268 |
| 08/25/00 | 7:35 | 18 | 119,061 | 270 | 272 | 402 | 82 | 95 | 82 | 496 | 3.7 | 13 | 1,024 | 278 |
| 08/30/00 | 13:15 | 23 | 130,361 | 90 | 229 | 462 | 48 | 84 | 91 | 651 | 5.3 | 27 | 1,648 | 119 |
| 08/31/00 | 7:45 | 24 | 130,361 | 0 | 221 | 481 | 100 | 85 | 89 | 523 | 4.2 | 30 | 1,821 | 225 |
| 09/01/00 | 11:10 | 25 | 136,678 | 230 | 221 | 507 | 96 | 85 | 90 | 342 | 2.8 | 33 | 2,131 | 271 |
| 09/05/00 | 16:00 | 29 | 157,253 | 204 | 219 | 608 | 100 | 87 | 83 | 661 | 5.0 | 54 | 3,725 | 379 |
| 09/06/00 | 10:00 | 30 | 160,437 | 177 | 218 | 626 | 100 | 88 | 80 | 666 | 4.8 | 57 | 4,035 | 413 |
| 09/07/00 | 10:00 | 31 | 165,796 | 223 | 218 | 650 | 100 | 88 | 79 | 672 | 4.7 | 62 | 4,520 | 485 |
| 09/08/00 | 10:00 | 32 | 169,170 | 141 | 215 | 674 | 100 | 88 | 78 | 677 | 4.8 | 67 | 4,969 | 449 |
| 09/11/00 | 16:00 | 35 | 188,129 | 243 | 218 | 752 | 100 | 89 | 72 | 1644 | 10.7 | 101 | 6,836 | 574 |
| 09/12/00 | 9:00 | 36 | 191,390 | 192 | 218 | 769 | 100 | 90 | 70 | 1855 | 11.7 | 110 | 7,232 | 559 |
| 09/13/00 | 9:00 | 37 | 192,039 | 27 | 212 | 793 | 100 | 90 | 76 | 1588 | 10.9 | 121 | 7,731 | 499 |
| 09/14/00 | 10:00 | 38 | 198,768 | 269 | 214 | 818 | 100 | 90 | 72 | 1310 | 8.4 | 129 | 8,321 | 566 |
| 09/15/00 | 9:30 | 39 | 206,348 | 323 | 217 | 841 | 100 | 91 | 64 | 1048 | 6.0 | 135 | 8,948 | 640 |
| 09/18/00 | 14:30 | 42 | 227,625 | 276 | 221 | 918 | 100 | 91 | 61 | 1665 | 9.1 | 165 | 11,268 | 723 |
| 09/19/00 | 11:30 | 43 | 232,051 | 211 | 221 | 939 | 100 | 91 | 56 | 1833 | 9.3 | 173 | 11,922 | 747 |
| 09/20/00 | 8:15 | 44 | 237,088 | 243 | 222 | 960 | 100 | 92 | 59 | 1520 | 8.1 | 180 | 12,565 | 743 |
| 09/21/00 | 8:00 | 45 | 242,548 | 230 | 222 | 984 | 100 | 92 | 64 | 1161 | 6.7 | 186 | 13,325 | 768 |
| 09/22/00 | 8:30 | 46 | 247,738 | 212 | 222 | 1008 | 100 | 92 | 68 | 1004 | 6.1 | 193 | 14,137 | 795 |
| 09/25/00 | 11:15 | 49 | 260,215 | 167 | 218 | 1083 | 100 | 92 | 72 | 523 | 3.4 | 203 | 16,434 | 737 |
| 09/26/00 | 11:00 | 50 | 263,976 | 158 | 217 | 1107 | 100 | 93 | 84 | 466 | 3.5 | 207 | 17,165 | 739 |
| 09/27/00 | 10:00 | 51 | 268,769 | 208 | 217 | 1130 | 100 | 93 | 87 | 411 | 3.2 | 210 | 17,939 | 807 |
| 09/28/00 | 11:50 | 52 | 271,506 | 106 | 214 | 1156 | 100 | 93 | 87 | 350 | 2.7 | 213 | 18,768 | 770 |
| 10/05/00 | 7:03 | 59 | 281,726 | 63 | 196 | 1319 | 100 | 94 | 114 | 224 | 2.3 | 228 | 22,159 | 499 |
| 10/11/00 | 14:15 | 65 | 312,791 | 205 | 197 | 1450 | 87 | 93 | 115 | 254 | 2.6 | 243 | 25,431 | 519 |
| 10/12/00 | 14:07 | 66 | 316,599 | 160 | 197 | 1474 | 100 | 93 | 112 | 259 | 2.6 | 245 | 26,065 | 638 |
| 10/19/00 | 13:00 | 73 | 345,916 | 176 | 195 | 1641 | 100 | 94 | 113 | 297 | 3.0 | 266 | 30,864 | 690 |
| 11/03/00 | 6:45 | 88 | 408,405 | 177 | 192 | 1995 | 100 | 95 | 115 | 197 | 2.0 | 296 | 40,125 | 628 |
| 11/09/00 | 10:00 | 94 | 408,405 | 0 | 179 | 2142 | 100 | 95 | 114 | 155 | 1.6 | 306 | 42,860 | 446 |
| 12/01/00 | 8:40 | 116 | 408,405 | 0 | 145 | 2669 | 100 | 96 | 116 | 108 | 1.1 | 330 | 47,434 | 208 |

* Bold values indicate actual sample results - the remaining values are interpolated.

Figure 4-6. SPH TCE Extraction Rate, Condensate Production, and Subsurface Temperatures



boiling point of TCE is lower than water, peak TCE recovery precedes peak condensate production.

Around day 40 subsurface temperatures and condensate production stabilized. At this point TCE is being steam stripped from the subsurface and TCE recovery rates drop dramatically. A drop in condensate production occurred from day 51 through 57 because the SPH power supply was shut down due to the malfunction of a component used to regulate applied voltage. When heating resumed and condensate production increased, TCE recovery remained low indicating the remediation was nearing completion.

4.4.1 Enhanced Degradation

Since TPH can accelerate biodegradation of chlorinated organics, indicator parameters were measured to quantify the effect of subsurface heating. Chloride levels in groundwater were measured before and after the SPH test and total organic carbon (TOC) levels were measured after the test. The following observations can be made:

- ▶ Chloride levels increased in all wells;
- ▶ The average initial chloride level was 71 mg/L (standard deviation 32 mg/L);
- ▶ The average final chloride level was 141 mg/L (st. dev. 44 mg/L);
- ▶ The average increase in the chloride concentration was 75 mg/L (st. dev. 44 mg/L);
and
- ▶ The final TOC concentration varied between 8 and 24 mg/L.

The increase in chloride concentration is most likely due to reductive dehalogenation of chlorinated hydrocarbons, mainly TCE. This biologically mediated reaction is greatly accelerated by the temperature rise caused by SPH. Assuming that no other significant source of chloride exists in the soil volume affected by SPH, an average chloride increase of 75 mg/L corresponds to an average degradation of 93 mg/L of TCE. This suggests that biological degradation of TCE, enhanced by heating, is a significant contributor to the overall TCE reduction at this site.

TOC is important because it represents a reservoir of electron donor compounds to support continued reductive dehalogenation of chlorinated hydrocarbons. The final TOC levels should be adequate to support the reduction of the residual TCE in the groundwater.

4.4.2 Helium Tracer Test Results

In order to quantify the ability of the soil vapor recovery wells to capture mobilized contaminants from the SPH array, URS conducted helium tracer recovery tests before heating (baseline), during Week 4, and during Week 9, at three depths (shallow, medium, and deep). The helium tracer recoveries were quantified at three pairs of locations, with measurements at each pair being collected at:

1. The well closest to, and screened in the same interval as, the injection point; and
2. The combined main header to the existing SVE system.

Helium concentrations were recorded at 2-minute intervals until the readings appeared to stabilize (two identical readings) or 1 hour elapsed. Temperature, dry gas volumes, and differential pressure readings were recorded at 5-minute intervals. Once the first test was complete, helium injection continued while the sampling was stopped, the impingers were weighed, and the sampling tube was connected to a port in the combined header. The process was repeated for samples from the combined header until the helium concentrations appeared to stabilize. The results of the helium tracer recovery tests are shown in Table 4-7. A more detailed discussion of the helium tracer recovery testing is provided in Appendix G.

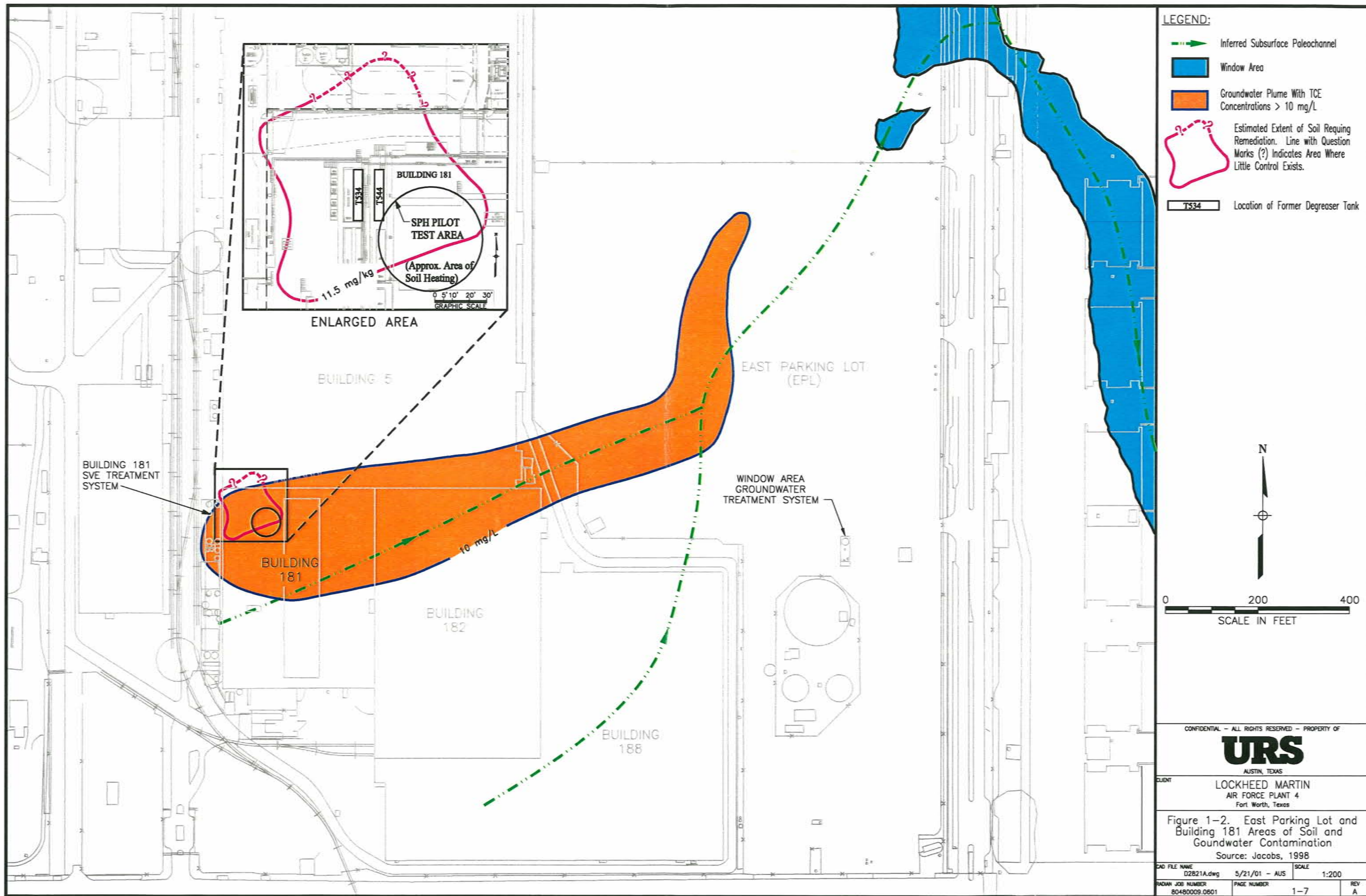
During the baseline testing, the helium tracer recoveries calculated for each of the individual vapor recovery wells ranged from 3% to 37%. Although these values are relatively low, the recovery from the entire network of wells ranged from 45% to 92%. These results would imply that the vapors that escape the nearest well's influence are still captured, to some degree, by the overall network. Helium tracer recoveries calculated for Week 4 increased over the baseline values at individual wells, as well as the overall combined header. The increased capture efficiency could be due to increased radius of influence as well as increased vapor phase porosity as the water table was depressed. Relatively high measured helium concentrations from VR-2d, along with uncertainty in the measurements and calculations, resulted in helium tracer recoveries greater than 100%. Although a recovery of greater than 100% does not make physical sense, the qualitative assessment is that vapor recovery at VR-2d is very good. Helium tracer recoveries calculated for Week 9 increased over Week 4 readings at each of the individual wells and for the main combined header measured with TA-13. Even though the calculated main combined header recoveries measured with VR-3d and VR-2d during Week 9 decreased from values calculated for Week 4, the recoveries are still relatively high.

In general, calculated helium tracer recoveries increased as heating progressed. Although there is considerable uncertainty involved in the measurements and calculations used to derive the recovery values, it appears that the vapor recovery network is doing an adequate job of capturing vapors generated within the treatment array.

Table 4-7
Helium Tracer Recovery Test Results Summary

| Monitoring Point | Moisture Content (%) | | | Corrected Helium Concentration (%) | | | Extracted Gas Specific Gravity | | | Extracted Gas Flowrate (SCFM) | | | Helium Recovery (%) | | |
|------------------|----------------------|--------|--------|------------------------------------|--------|--------|--------------------------------|--------|--------|-------------------------------|--------|--------|---------------------|--------|--------|
| | Baseline | Week 4 | Week 9 | Baseline | Week 4 | Week 9 | Baseline | Week 4 | Week 9 | Baseline | Week 4 | Week 9 | Baseline | Week 4 | Week 9 |
| TA-12 | 2.0 | | | 2.4 | | | 0.97 | | | 13.8 | | | 25 | | |
| Main Header | 2.6 | | | 1.1 | | | 0.98 | | | 111.9 | | | 92 | | |
| VR-3d | 2.7 | 22.6 | 38.1 | 3.1 | 5.9 | 5.5 | 0.96 | 0.87 | 0.81 | 15.3 | 12.1 | 13.7 | 37 | 55 | 58 |
| Main Header | 3.4 | 27.6 | 32.2 | 0.5 | 0.9 | 0.6 | 0.98 | 0.89 | 0.87 | 111.7 | 120.1 | 163.3 | 45 | 87 | 74 |
| TA-13 | | 54.7 | 60.8 | | 2.3 | 6.2 | | 0.78 | 0.72 | | 12.4 | 16.8 | | 22 | 80 |
| Main Header | | 28.3 | 31.8 | | 0.9 | 0.8 | | 0.89 | 0.87 | | 122.1 | 163.3 | | 88 | 105 |
| VR-2s | 2.7 | | | 0.6 | | | 0.99 | | | 7.0 | | | 3 | | |
| Main Header | 3.0 | | | 0.8 | | | 0.98 | | | 112.1 | | | 69 | | |
| VR-2d | | 54.9 | 68.7 | | 20.7 | 32.0 | | 0.63 | 0.47 | | 10.1 | 10.5 | | 161 | 259 |
| Main Header | | 29.4 | 31.9 | | 1.3 | 0.8 | | 0.88 | 0.87 | | 118.4 | 165.1 | | 120 | 96 |

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5.0 COST SUMMARY

As shown in Table 5-1, the total estimated cost for the pilot test was \$548,306 including costs incurred by URS, LM Aero, and IT Corporation. Because the pilot test made use of the existing Building 181 SVE System, the reported costs only include expenses associated with the thermal enhancement technology. When comparing the reported unit costs with other treatment technologies, the costs associated with the SVE system (e.g., blower, air stripper, CATOX, labor, utilities) should be incorporated.

The following line items included in the cost estimate are consistent with *Guidance to Documenting and Managing Cost and Performance Information for Remediation Projects* (October 1998) reporting format:

Capital Costs

- ▶ Mobilization, setup, and demobilization;
- ▶ Equipment construction and installation; and
- ▶ Work Plan, QA/QC Plan, Field Sampling Plan, and Health and Safety Plan preparation.

Operation and Maintenance (O&M) Costs

- ▶ Operational labor;
- ▶ Electricity costs;
- ▶ Equipment rental;
- ▶ Groundwater, soil, soil vapor sample analyses and helium tracer recovery testing; and
- ▶ Other testing (indoor air monitoring).

Other Technology-Specific Costs

- ▶ TCLP testing of drill cuttings, and VOC testing of air stripper effluent discharged to the POTW; and
- ▶ Disposal of drill cuttings and air stripper effluent.

Other Project Costs

- ▶ Preparation of this SPH pilot-scale test report.

Table 5-1
AFP4 SPH Pilot Test Cost Summary

| Cost Category/Element | | Cost (Year 2000 \$) | Cost for Calculating Unit Cost |
|-----------------------|---|----------------------|--------------------------------|
| 1. | Capital Cost for Technology | | |
| | Technology mobilization, setup, and demobilization | \$58,000 | |
| | Planning and preparation | \$65,906 | |
| | Site work | \$0 | |
| | Equipment and appurtenances/construction – Structures - Process Equipment and -appurtenances/construction - Other (specify) | \$162,812 | |
| | Startup and testing | \$0 | |
| | Other (Includes non process equipment) | \$0 | |
| | Total capital costs | | \$286,718 |
| 2. | O&M for Technology | | |
| | Labor | \$85,000 | |
| | Materials | \$0 | |
| | Utilities and fuel | \$28,588 | |
| | Equipment ownership, rental, or lease | \$27,000 | |
| | Performance testing and analysis | \$41,515 | |
| | Other (Includes non process equipment overhead and health and safety) | \$35,000 | |
| | Total operation and maintenance costs | | \$217,103 |
| 3. | Other Technology-Specific Costs | | |
| | Compliance testing and analysis | \$1,485 | |
| | Soil, sludge, and debris excavation, collection, and control | | |
| | Disposal of residues | \$3,000 | |
| 4. | Other Project Costs | \$40,000 | |
| | Total cost (year basis for cost) | \$548,306 | |
| | Total cost for calculating unit cost | | \$503,821 |
| | Pounds of TCE Removed | | 330 |
| | Calculated unit cost (\$/lb) | | \$1,526.73 |
| | Volume of Treated Media (yd ³) | | 3,930 |
| | Calculated unit cost (\$/yd ³) | | \$128.20 |
| | Basis for quantity treated | | |

In order to compare full-scale remedial technology costs, the guidance recommends reporting unit costs as the sum of the capital and O&M costs divided by the mass of contaminants removed or by the volume of media treated. Using these criteria, the SPH pilot test incurred unit costs of approximately \$1,500/pound of TCE removed and \$130/cubic yard of treated media. It should be noted that pilot-scale unit costs are typically considerably higher than full-scale unit costs due to the small size of the pilot unit and additional performance testing associated with studies. Also, there is considerable mobilization and demobilization response that would be approximately the same whether heating one or multiple arrays. Because the costs reported in Table 5-1 are for the thermal enhancement only, the reported unit costs should be evaluated as an additional cost (on top of the existing SVE system costs) to achieve additional contaminant removal compared to SVE removal rates without enhancement.

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6.0 CONCLUSIONS AND RECOMMENDATIONS

Overall, the SPH pilot test proved successful in heating the subsurface and removing TCE contaminants from the soil and groundwater at the site. The following bullet items briefly summarize the results of the test and recommended future actions relating to SPH implementation at AFP4.

6.1 Conclusions

- ▶ SPH raised the subsurface temperature above the boiling point of TCE at depth (73°C) in 21 of 24 monitoring locations. At 14 of 24 monitoring locations, subsurface temperatures reached the boiling point of water.
- ▶ Based on the work plan statistical evaluation criteria, involving both 95% UCL and means comparisons, SPH was effective at remediating the soil and groundwater.
- ▶ Pre- and post-test soil sampling results showed that although only one of the 15 pre-test soil samples had a TCE concentration (18.3 mg/kg) > the 11.5 mg/kg groundwater protection threshold, it was reduced to < 1 mg/kg by the heating. The soil mean concentrations fell from 3.4 to 0.16 mg/kg, yielding a 95% reduction. The 95% UCL concentration was reduced from 8.4 to 0.29 mg/kg, yielding a 97% reduction.
- ▶ SPH reduced TCE concentrations in the groundwater to below the 10 mg/L performance objective. Mean concentrations fell from 73.4 to 3.6 mg/L, yielding a 95% reduction. The 95% UCL concentrations were reduced from 129 to 5.7 mg/L, yielding a 96% reduction. Only one well was not reduced to below the threshold limit (WJETA062 had 10.7 mg/L TCE in post-test sampling).
- ▶ Approximately 330 pounds of TCE were removed from the subsurface during the pilot test. Most of this was in the vapor phase, with less than one pound being removed as condensate.

- ▶ The chloride measurements in groundwater indicate that biodegradation of TCE was enhanced by the heating resulting from SPH. This biodegradation probably consisted of reductive dehalogenation or halorespiration and contributed significantly to the reduction of TCE concentrations.
- ▶ The cost of remediating the subsurface with SPH is approximately \$1,500/lb of TCE removed, or \$130/cubic yard. This does not include costs for construction and operation of the SVE system.
- ▶ The system was able to input the required energy at an acceptable level and rate without exceeding 15 VAC induced voltage on any component accessible to personnel. No unsafe operating voltage potentials were established during the test.
- ▶ Continuous monitoring of air quality within the building showed no measurable deterioration as a result of the remediation.
- ▶ Helium tracer recovery test and indoor air monitoring data indicate the SVE system was effective at capturing vapors generated from the heating.
- ▶ Average subsurface vapor flow and recovery appeared to increase with increased temperatures.
- ▶ Technology related safety data (e.g., induced voltages, air quality) and the pipe corrosion analysis indicate larger-scale SPH implementation could be performed within the building without unacceptable impact on plant operations.
- ▶ The existing treatment system adjacent to Building 181 appears adequate for a larger-scale implementation of SPH technology.
- ▶ Accordingly, data gathered during the pilot-scale test support the design and implementation of larger-scale SPH application within the Building 181 and Building 5 area.

6.2 Recommendations

- ▶ *Additional Source Area Characterization:* The identified area of soil contamination within Building 181, based on soil sampling and analysis, is approximately ¼-acre. However, there is insufficient soil contaminant data (laterally and vertically) in some of the outer portions of the identified soil contaminant zone. Although historical soil gas data were used to help further define potential problem areas in the soil, additional characterization of the extent of soil contamination in these areas should be performed prior to, or concurrently with, remedial technology (e.g., SPH) application. The use of either soil or soil gas sampling and an on-site GC, or soil headspace analysis with a PID, would allow rapid sample turnaround and decision making. This may be the most economical route since an SPH system expansion would necessarily involve some type of source zone edge delineation for electrode placement purposes.

There is also some question as to whether the weathered limestone beneath the Terrace Alluvium contains DNAPL, and if this could contribute TCE to the groundwater regime long after remediation of the groundwater is complete. Although the SPH test demonstrated that the heating cleaned groundwater to the desired TCE concentrations, and heating (and thus remediation) should have extended for several feet into the underlying limestone, the wells used to assess test performance were not screened down to, or below, the limestone/alluvium interface. The existing site monitoring wells were screened such that any lower-lying DNAPL (e.g., at the limestone/Terrace Alluvium interface or within the upper, weathered portion of the limestone) would not be detected in the wells unless there was an appreciable pooled accumulation (> 1 ft thickness at interface). To address whether the weathered limestone could serve as a continuing source of TCE (via DNAPL dissolution), a select number of borings and wells should be completed such that this determination is possible. Again, this type of activity could be included in plans for a larger-scale implementation.

- ▶ *Smaller Electrode Array Diameter:* In order to more effectively couple the electrical energy to the subsurface at this site, the electrode array diameter should be reduced from 45 feet to approximately 38 feet. This will reduce the overall power density at each electrode to minimize “dryout” conditions and

promote more constant power delivery. A smaller array diameter will also result in more efficient heating in the deepest portion of the treatment area that is subject to conductive heat losses.

- ▶ *Shallower Electrode Conductive Interval:* The pilot test was designed to treat soils from 2.5 to 37 feet bgs. Based on soil sampling results, this was appropriate for this test. However, temperature monitoring indicated minimal heating of the 2 feet bgs interval or the building floor during the test. In future designs it is possible to extend the treatment zone closer to the bottom of the building slab without deleterious effects.
- ▶ *Relocate Drip Tube Opening:* Three electrode locations suffered failure of the conductive material in the deep interval. The water drip system caused thermal shock on the electrode bolts. Future installations should have the opening of all drip tubes located several inches below the bolts rather than above to eliminate the thermal shock potential to damage the electrode.
- ▶ *Minimize Demobilization:* Since the existing SVE capture and treatment system is likely sufficient to handle a larger SPH treatment area, demobilization efforts should be kept to a minimum. Essentially, only the SPH power supply and steam condenser unit should be removed from the site. The existing piping and subsurface components are being left in place until a determination is made on whether to proceed with SPH on a larger scale.
- ▶ *Treatment System Readiness:* To prevent delayed downtimes during a larger-scale implementation of SPH, a spare blower and backup vapor treatment system (plumbed) should be on site.
- ▶ *Soil Remediation Assessment:* Examine alternate soil contaminant measurement techniques. Traditional soil sampling techniques are very point-specific, and require considerable effort to collect within the building. For example, some variety of soil gas sampling may provide for a more representative assessment of soil treatment as a whole, and also provide for continued sampling (e.g., to assess rebound).

- ▶ *Rebound Assessment:* At the earliest opportunity, take select additional groundwater samples to help determine whether rebound has occurred in the test cell. In addition to DTT wells used to measure test performance, include any other existing wells in the SPH test area that are screened to bedrock (none known with available information).
- ▶ *Expand Pilot-Scale Test Area:* Because some of the difficulty relating to measuring SPH technology effectiveness at this site relates to potential boundary effects and contaminant rebound potential, the test area could be expanded to reduce the uncertainties associated with these issues. These issues stem from the test being performed *within* a larger area of soil and groundwater contamination, complicating evaluation of issues like whether contaminants are being pushed from the edge of the array, or infiltrating the remediated array shortly after heating stops. For example, approximately 10 slightly smaller arrays could treat the entire identified area of soil contamination believed to be sourcing the EPL groundwater contaminant plume (including an estimated additional ¼-acre area for uncertainties in extent of soil contamination), while gaining valuable data on these issues. The 10 array estimate is based on this conservative ½-acre treatment area and each array encompassing approximately 2,225 ft².
- ▶ *Proceed with Design or Detailed Work Plan:* Expanding the scope of the test would require proceeding with the design or an updated work plan, which is already funded. Data gathered during the SPH pilot-scale test are sufficient to support the 60% design or a more detailed work plan. Additionally, pilot-scale test results indicate SPH is effective at the site and appropriate for larger-scale implementation.
- ▶ *Detailed Work Plan with Submittals:* Considering the USAF funding constraints (e.g., obligation timeframes), an enlarged SPH test could be performed with a detailed work plan that contains the necessary design-related submittals (e.g., piping, electrical). This approach would expedite implementation and allow increased field flexibility. A somewhat flexible approach may also be the most realistic considering the logistical challenges associated with construction/implementation in the AFP4 operating environment.

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7.0 LESSONS LEARNED

Following are the lessons learned through the performance of the SPH test at AFP4.

- ▶ *Power Input Rate:* During design of the SPH system, energy input to the subsurface was conservatively estimated to be 493,000 kW-hrs at a power rate of 325 kW. Actual power rate to the site during the pilot test averaged 192 kW over the duration of the project. A total of 408,405 kW-hrs of energy were input over the life of the project. Analytical data indicate that the total energy input was sufficient to successfully achieve the goals set out for the test. The lower power rate required a greater number of operating days to achieve the energy input needed to complete the remediation. Several factors led to the reduced average power input, including malfunction of system components, the electrical curtailment program, water addition drip locations, and the electrode array design specifications.
- ▶ *Spare Parts:* In an effort to minimize lost operating time due to malfunction of equipment, a larger stock of SPH equipment spare parts should be kept on-hand during a larger-scale implementation. This will help improve operating time and increase the average energy input to the subsurface over the life of the project.
- ▶ *Groundwater Well Screen Intervals:* The screened intervals on the wells used for measuring saturated zone remediation were generally one to three feet above the top of the underlying bedrock surface. To better assess DNAPL presence, and the potential for DNAPL migration and accumulation, remediation monitoring well screen intervals should intercept the bedrock/alluvium interface, and possibly extend some distance into the limestone bedrock.
- ▶ *Building Logistics:* Originally the SPH test was planned for outdoors, near the EPL. However, during the project plan phase the test was moved indoors, within the source area of the TCE contamination. Because AFP4 is an operating facility, and remediation can not significantly interfere with manufacturing processes, the logistical issues were magnified. Although the

test was performed with minimal disruption of operations, a larger-scale implementation will involve increased logistical challenges.

- ▶ *Treatment System Reliability:* Use of the existing treatment system adjacent to Building 181 was fortuitous for the SPH test. Overall, the arrangement worked well for the vapor and condensate treatment. However, for a larger-scale implementation additional treatment system spare parts would minimize the amount of system downtime.
- ▶ *Soil Analytical Methodology:* Encore sampling was performed on the soil samples to minimize VOC loss and help improve the representativeness of laboratory measured soil contaminant levels over more traditional approaches. However, there was some difficulty with soil sample results that exceeded laboratory instrumentation calibration ranges. When this occurred, and there was a need for backup sample analysis, the distilled-water-preserved backup sample analyses provided lower contaminant levels than the original methanol-extracted soil sample. This is an identified problem with the methodology that should be further evaluated prior to future use.
- ▶ *Soil Treatment Evaluation Methodology:* Soil sampling techniques to minimize VOC loss prior to laboratory analyses (even including the most recent innovations) are somewhat limited in the amount of remediation effectiveness information they can provide. This is especially true when the soil contamination is randomly distributed due to the heterogeneous nature of the subsurface materials. For a larger-scale implementation (or future similar pilot-scale tests) alternate approaches to assessing the degree of remediation in the vadose zone should be evaluated. One such approach may be the use of soil gas sampling, although the heating effects of the technology on soil gas concentrations would need to be considered.
- ▶ *SPH Treatment Interval:* One of the concerns with the SPH technology application within Building 181 was the degree of heating to the building slab. Therefore, the top of the electrically conductive interval was placed seven feet below the slab. This placement resulted in only a slight warming of the slab during the test period. However, since the highest levels of subsurface contamination encountered during drilling and installation of the various

subsurface test components (measured with the PID) were at about five feet below floor level (at the fill/alluvial material interface), future electrode placements could be closer to the building slab level. This would more effectively heat this shallower, contaminated subsurface interval.

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8.0 REFERENCES

- Eckenfelder, Inc., 1998. DNAPL Tracer Tests, Air Force Plant 4, Fort Worth, Texas, September, 1998.
- Intera Inc., 1998. East Parking Lot PITT Report.
- Jacobs Engineering Group Inc., 1998a. *Draft East Parking Lot/Window Area Technical Report (Volumes I, II, and III), Air Force Plant 4, Fort Worth, Texas*, Contract F41624-94-D-8116-0005, August 1998.
- Jacobs Engineering Group Inc., 1998b. *Draft Dense Non-aqueous Phase Liquid (DNAPL) Remediation Alternatives Evaluation, Air Force Plant 4, Fort Worth, Texas*, Contract F41624-94-D-8116-0005, November 1998.
- Parsons Engineering Science, Inc., 1998. *Technical Report on the Geology of Air Force Plant 4 and Naval Air Station Fort Worth Joint Reserve Base, Fort Worth, Texas*, Air Mobility Command, Environmental Architect Engineer Services, Contract No. F11623-94-D0024, Delivery Order RL50, November 1998.
- Radian, September 1999. *Preliminary (30%) Remedial Design, Dense Non-Aqueous Phase Liquid, Eastern Parking Lot Plume, Air Force Plant 4, Fort Worth, Texas*, prepared for the Air Force Center for Environmental Excellence (AFCEE) and Aeronautical Systems Center (ASC) under Contract No. F41624-97-D-8020, Delivery Order 0109.
- Radian & CES, March 2000a. *Six-Phase HeatingTM Pilot-Scale Test, Work Plan, Dense Non-Aqueous Phase Liquid, Eastern Parking Lot Plume, Air Force Plant 4, Fort Worth, Texas*, prepared for the Air Force Center for Environmental Excellence (AFCEE) and Aeronautical Systems Center (ASC) under Contract No. F41624-97-D-8020, Delivery Order 0109.
- Radian & CES, March 2000b. *Six-Phase HeatingTM Pilot-Scale Test, Sampling and Analysis Plan, Dense Non-Aqueous Phase Liquid, Eastern Parking Lot Plume, Air Force Plant 4, Fort Worth, Texas*, prepared for the Air Force Center for Environmental Excellence (AFCEE) and Aeronautical Systems Center (ASC) under Contract No. F41624-97-D-8020, Delivery Order 0109.

Radian & CES, March 2000c. *Six-Phase Heating™ Pilot-Scale Test, Health and Safety Plan, Dense Non-Aqueous Phase Liquid, Eastern Parking Lot Plume, Air Force Plant 4, Fort Worth, Texas*, prepared for the Air Force Center for Environmental Excellence (AFCEE) and Aeronautical Systems Center (ASC) under Contract No. F41624-97-D-8020, Delivery Order 0109.

Rust Geotech, 1995a. *Air Force Plant 4 Remedial Investigation and Preliminary Assessment/Site Inspection Report, Volume I*, Prepared for U.S. Department of the Air Force, Headquarters Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio.

Rust Geotech, 1995b. *Air Force Plant 4 Feasibility Study*. Prepared for U.S. Department of the Air Force, Headquarters Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio.

Rust Geotech, 1996. *Record of Decision for AFP 4*. Prepared under Department Of Energy (DOE) Contract No. DE-AC04-94AL96907, July 1996.

Urquhart, 1962. *Civil Engineering Handbook*, 4th Edition.

Appendix A
Lithologic and Completion Logs

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring E1

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------------|---------------------|--|--------------------------|-----------|
| Date(s) Drilled | 04/25/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 33.6 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 12.5" | Ground Surface Elevation | 655.08 |
| Groundwater Level(s) | 28.5' ; 4/25/2000 | Sampling Method | Cuttings | Hammer Data | NA |
| Borehole Backfill | See electrode completion | | Comments Borehole for electrode installation | | |

Repon. _12AS_CLEVELAND+-USCS; Project File: H:\PROJECTS\WC_USERS\ACTIVE-1\GINT_P-1\PROJECTS... P#4.GPJ; Data Template: WC-CORP2.GDT Printed: 11/15/00

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|--------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 0 | 0 | | | | Con Fill | Concrete Gravelly SILT: pale brown (10YR, 6/3), medium stiff, moist, minor subrounded limestone gravel | Fill Material |
| 650 | 5 | | | 88.2 | CL | Silty CLAY: reddish yellow (7.5YR, 6/6), soft, moist, slightly plastic, minor fine sand | Breathing Zone = 3.2 ppm |
| | 10 | | | 83.4 | | | |
| 640 | 15 | | | | ML | Clayey SILT: yellowish red (5YR, 5/6), soft, moist, medium plasticity, minor fine sand, minor angular-subrounded gravel | Breathing Zone = 3.4 ppm |
| | 20 | | | 64.2 | | | |
| 630 | 25 | | | 9.1 | GC | Sandy GRAVEL: yellowish red (5YR, 5/6), moist, low plasticity, 30% subrounded, well graded limestone gravel | Breathing Zone = 3.2 ppm |
| | 30 | | | 8.8 | | | |
| | | | | 7.6 | | becomes very soft, very moist, medium plasticity | |
| 35 | | | | | | END OF BORING @ 33.6' | Auger Refusal |



Project: SPH PILOT TEST**Project Location: AIR FORCE PLANT 4, FORT WORTH, TX****Project Number: 80480009****Log of Boring E2**

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------------------------|---------------------|-------------------------------------|--------------------------|-----------|
| Date(s) Drilled | 04/18/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 33.7 feet |
| Drill Rig Type | B-61 | Drill Bit Size/Type | 12.5" | Ground Surface Elevation | 655.21 |
| Groundwater Level(s) | No measurable free water in borehole | Sampling Method | Cuttings | Hammer Data | NA |
| Borehole Backfill | See electrode completion | Comments | Borehole for electrode installation | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|--|--------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| | 0 | | | | Con Fill | Concrete | |
| | | | | 3.6 | | Clayey SILT: pinkish gray (7.5YR, 7/3), minor angular gravel, dry, medium stiff | Fill Material |
| 650 | 5 | | | 6.4 | CL | Silty CLAY: light brownish yellow (10YR, 6/4), minor angular gravel, dry, medium stiff | |
| | 10 | | | 8.9 | ML | Clayey SILT: light brownish yellow (10YR, 6/4), moist, medium stiff to soft, slightly plastic | Breathing Zone = 3.0 ppm |
| 640 | 15 | | | 11.2 | | | |
| | 20 | | | | CL | Silty CLAY: yellowish red (5YR, 5/8), moist, soft, slightly plastic, trace of angular gravel | Breathing Zone = 3.2 ppm |
| 630 | 25 | | | 4.9 | CL | Silty CLAY: increasing silt, strong brown (7.5YR, 4/6), low to medium plasticity, moist, minor angular-subrounded gravel | |
| | 30 | | | | | increasing limestone gravel with depth | |
| | | | | 3.8 | | | |
| 35 | | | | | | END OF BORING @ 33.7' | Auger Refusal |

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring E3

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------------|---------------------|--|--------------------------|-----------|
| Date(s) Drilled | 04/27/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 34.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 12.5" | Ground Surface Elevation | 655.15 |
| Groundwater Level(s) | 29.0' ; 4/28/2000 | Sampling Method | Cuttings | Hammer Data | NA |
| Borehole Backfill | See electrode completion | | Comments Borehole for electrode installation | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|--------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 0 | 0 | | | | Con Fill | Concrete | |
| | | | | 16.0 | | Clayey SILT: light gray (10YR, 7/2), moist, < 25% rounded limestone gravel, small pieces of wood | Fill Material |
| 650 | 5 | | | 34.7 | | as above, soft with slight plasticity | Breathing Zone = 3.4 ppm |
| | 10 | | | | | | |
| | | | | 12.3 | ML | Clayey SILT: reddish yellow (7.5YR, 6/6), moist, traces of limestone gravel | |
| 640 | 15 | | | | | | |
| | | | | 9.6 | | as above | Breathing Zone = 3.4 ppm |
| | 20 | | | | | | |
| | | | | 8.7 | CL | Silty CLAY: reddish yellow (5YR, 6/6), medium stiff to soft, moist, minor limestone gravel | |
| 630 | 25 | | | | | | |
| | | | | | CL | Silty CLAY: light grey (10YR, 7/2), soft, moist to very moist, increasing limestone gravel with depth | Breathing Zone = 3.2 ppm |
| | 30 | | | | | | |
| | 35 | | | | | END OF BORING @ 34' | Auger Refusal |

Report: _12AS_CLEVELAND+/-USCS; Project File: H:\PROJECTS\WC_USERS\ACTIVE-1\GINT_P-1\PROJECTS...r#4.GPJ; Data Template: WC-CORP2.GDT Printed: 11/15/00

URS

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring E4

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------------|---------------------|--|--------------------------|-----------|
| Date(s) Drilled | 04/19/2000 | Logged By | Stephen Fain | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 33.6 feet |
| Drill Rig Type | B-61 | Drill Bit Size/Type | 12.5" | Ground Surface Elevation | 655.04 |
| Groundwater Level(s) | 29.2' ; 4/19/2000 | Sampling Method | Cuttings | Hammer Data | NA |
| Borehole Backfill | See electrode completion | | Comments Borehole for electrode installation | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|--|--------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 0 | | | | | Con Fill | Concrete Silty CLAY: light grey (10YR, 7/2), dry, minor (10%) angular to subrounded gravel | Fill Material |
| 650 | 5 | | | 55.0 | ML | Clayey SILT: light brown (7.5YR, 6/4), homogeneous, moist | Breathing Zone = 4.5 ppm |
| | 10 | | | 32.0 | GM | Gravelly SAND: pink (7.5YR, 7/3), silty, 30% limestone gravel, noncohesive, subrounded, poorly sorted, dry | Breathing Zone = 3.0 ppm |
| 640 | 15 | | | | | becomes 25% gravel, subrounded to rounded | |
| | 20 | | | 11.0 | ML | Clayey SILT: reddish yellow (7.5YR, 6/6), cohesive, moist, homogeneous, soft to medium stiffness | |
| | 25 | | | 8.0 | | becomes very moist | |
| 630 | 25 | | | 8.0 | | minor carbonate nodules, plastic, cohesive | |
| | 30 | | | | GM | Driller feels gravel @ 29.5 feet Gravelly SILT with clay, very moist to wet | |
| 35 | | | | | | END OF BORING @ 33.6' | Auger Refusal |

Project: SPH PILOT TEST**Project Location: AIR FORCE PLANT 4, FORT WORTH, TX****Project Number: 80480009****Log of Boring E5**

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------------|---------------------|--|--------------------------|-----------|
| Date(s) Drilled | 04/26/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 31.4 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 12.5" | Ground Surface Elevation | 654.97 |
| Groundwater Level(s) | 29.0' ; 4/26/2000 | Sampling Method | Cuttings | Hammer Data | NA |
| Borehole Backfill | See electrode completion | | Comments Borehole for electrode installation | | |

Report: _12AS_CLEVELAND+-USCS; Project File: H:\PROJECTS\WC_USERS\ACTIVE-1\GINT_P-1\PROJECTS...r#4.GPJ; Data Template: WC-CORP2.GDT Printed: 11/15/00

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|---------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 0 | | | | | Con Fill | Concrete | |
| | | | | | | Silty Gravel: very pale brown (10YR, 7/3), well graded limestone gravel, angular-subrounded, dry, strong solvent odor | Fill Material |
| 650 | 5 | | | 4141 | ML | Clayey SILT: reddish yellow (7.5 YR, 6/6), some fine sand, plastic, dry to moist, slight solvent odor | Breathing Zone = 3.4 ppm |
| | 10 | | | 186 | GM | Sandy GRAVEL: reddish yellow (7.5YR, 6/6), well graded, 10% silt, dry, slight solvent odor | Breathing Zone = 10.4 ppm |
| 640 | 15 | | | 13.4 | ML | Clayey SILT: strong brown (7.5YR, 5/8), slightly plastic, moist, minor limestone gravel, angular, no odor | Breathing Zone = 3.4 ppm |
| | 20 | | | | | | |
| | 25 | | | 6.9 | ML | Clayey SILT: yellowish red (5YR, 5/6), fine sand, moist, trace of limestone gravel, no odor | Breathing Zone = 3.4 ppm |
| 630 | | | | | CL | Silty CLAY: yellowish red (5YR, 5/6), low plasticity, medium stiff to stiff, moist, trace of limestone gravel | Breathing Zone = 3.4 ppm |
| | 30 | | | 4.1 | | | |
| | | | | | | END OF BORING @ 31.4' | Auger refusal |
| 620 | 35 | | | | | | |

URS

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring E6

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------------|---------------------|--|--------------------------|-----------|
| Date(s) Drilled | 04/24/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 33.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 12.5" | Ground Surface Elevation | 654.97 |
| Groundwater Level(s) | 28.0' ; 4/24/2000 | Sampling Method | Cuttings | Hammer Data | NA |
| Borehole Backfill | See electrode completion | | Comments Borehole for electrode installation | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|--------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 0 | | | | | Con Fill | Concrete | |
| | | | | | | Silty CLAY: light grey (10YR, 7/2), moist, soft, minor limestone gravel, subrounded, well graded | Fill Material |
| 650 | 5 | | | 218 | CL | Silty CLAY: reddish yellow (5YR, 6/6), moist, soft, low plasticity, minor angular-subrounded well graded limestone gravel | Breathing Zone = 3.4 ppm |
| | 10 | | | | | becoming medium plastic | |
| 640 | 15 | | | 128 | ML | Clayey SILT: reddish yellow (7.5YR, 6/6), moist, soft, high plasticity, minor poorly graded limestone gravel | |
| | 20 | | | 260 | | | |
| | | | | | | slight odor | |
| 630 | 25 | | | 328 | | very soft, minor well graded limestone gravel | Breathing Zone = 3.4 ppm |
| | 30 | | | 34.6 | | becoming medium stiff | Breathing Zone = 3.2 ppm |
| | | | | | | END OF BORING @ 33' | Auger refusal |
| 620 | 35 | | | | | | |

URS

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring E7

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------------|---------------------|--|--------------------------|-----------|
| Date(s) Drilled | 04/26/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 34.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 12.5" | Ground Surface Elevation | 655.04 |
| Groundwater Level(s) | 28.4' ; 4/26/2000 | Sampling Method | Cuttings | Hammer Data | NA |
| Borehole Backfill | See electrode completion | | Comments Borehole for electrode installation | | |

Repon. 12AS_CLEVELAND+USCS; Project File: H:\PROJECTS\WC_USERS\ACTIVE-1\GINT_P-1\PROJECT1...P#4.GPJ; Data Template:WC-CORP2.GDT Printed: 11/15/00

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|--------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | Graphic Log | | |
| 0 | 0 | | | | | Concrete | |
| | | | | | | Gravelly SILT: pale brown (10YR, 6/3), medium stiff, dry, well graded angular gravel | Fill Material |
| 650 | 5 | | | 30.4 | | medium stiff to soft, >40% limestone gravel | |
| | | | | | | ML | Breathing Zone = 3.4 ppm |
| | 10 | | | 14.5 | | | |
| 640 | 15 | | | 14.1 | | as above | Breathing Zone = 3.2 ppm |
| | 20 | | | | | ML | |
| | | | | 13.2 | | Clayey SILT: yellowish red (5YR, 5/6), medium stiff, intermixing of fine sands, moist, slightly plastic, traces of limestone gravel | |
| 630 | 25 | | | | | increasing gravel | |
| | 30 | | | 10.4 | | ML | Breathing Zone = 3.3 ppm |
| | | | | 8.8 | | increasing moisture | |
| 35 | 34 | | | | | END OF BORING @ 34' | Auger refusal |

URS

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring PP1

Sheet 1 of 1

| | | | | | |
|----------------------|---------------------------|---------------------|---|--------------------------|----------|
| Date(s) Drilled | 04/28/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 7.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 655.21 |
| Groundwater Level(s) | NA | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See piezometer completion | | Comments Borehole for pressure piezometer | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|--|--------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 655 | 0 | | | | Con | Concrete | |
| | 1 | | 90 | 12.1 | Fill | Clayey SILT: light grey (10YR, 7/2), moist, minor gravel | |
| | 2 | | | | | | Fill Material |
| | 3 | | 80 | 28.6 | | | |
| | 4 | | | | | | Breathing Zone = 3.4 ppm |
| 650 | 5 | | 90 | 62.7 | | | |
| | 6 | | | | | becoming reddish yellow (5YR, 6/6), soft | |
| | 7 | | | | | END OF BORING @ 7' | |
| | 8 | | | | | | |
| | 9 | | | | | | |
| 645 | 10 | | | | | | |
| | 11 | | | | | | |
| | 12 | | | | | | |
| | 13 | | | | | | |
| | 14 | | | | | | |
| | 15 | | | | | | |

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring TMP 1

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|---|--------------------------|-----------|
| Date(s) Drilled | 05/01/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 32.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 655.10 |
| Groundwater Level(s) | 29.7' ; 5/1/2000 | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See TMP completion | Comments | Borehole for temperature monitoring point | | |

Report: _12AS_CLEVELAND+-USCS; Project File: H:\PROJECTS\WC_USERS\ACTIVE-1\GINT_P-1\PROJECTS...r#4.GPJ; Data Template:WC-CORP2.GDT Printed: 11/15/00

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|-------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 0 | | | | | | Concrete | |
| | | | 40 | 4.6 | Con Fill | Gravelly SILT: pale brown (10YR, 6/3), medium stiff, well graded, minor angular limestone gravel, dry | Fill Material |
| | | | 70 | 10.8 | | | |
| | | | | | | medium stiff to soft, >25% limestone gravel | 4-6' VOC sample |
| 650 | 5 | | 50 | 700 | | | |
| | | | 80 | 10.8 | ML | Clayey SILT: strong brown (7.5YR, 5/6), soft, minor fine sand, moist, medium stiff | 6-8' VOC sample |
| | | | 90 | 7.1 | | | |
| | 10 | | 90 | 6.1 | | | |
| | | | 75 | 6.5 | | | |
| 640 | 15 | | 75 | 8.7 | | | 14-16' VOC sample |
| | | | | | | medium stiff to soft, homogeneous, cohesive | |
| | | | 100 | 6.6 | | | |
| | 20 | | 100 | 5.1 | | | |
| | | | 75 | 6.4 | ML | Clayey SILT: yellowish red (5YR, 5/6), few silty clay zones, medium stiff, slight to medium plasticity, moist, minor limestone gravel | |
| | | | 80 | 6.5 | | | |
| 630 | 25 | | 80 | 50 | | @25' there is a transition into gravel (1' thick), angular, stiff | 24-26' VOC sample |
| | | | 60 | 9.1 | | | |
| | | | 40 | 8.3 | | | |
| 30 | | | 70 | 25.0 | ML | Clayey SILT: brownish yellow (10YR, 6/6), gravelly, sandy, wet @ 31'. | 30-32' VOC sample |
| | | | | | | END OF BORING @ 32' | Auger Refusal |
| 35 | | | | | | | |

URS

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring TMP 2

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|--|--------------------------|-----------|
| Date(s) Drilled | 05/01/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 32.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 655.09 |
| Groundwater Level(s) | 29.6' ; 5/1/2000 | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See TMP completion | | Comments Borehole for temperature monitoring point | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|------------------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| | 0 | | 10 | 5.1 | Con Fill | Concrete Silty GRAVEL: light gray (10YR, 7/2), coarse, angular-subrounded limestone gravel, dry | |
| | | | 25 | 6.1 | | | Fill Material |
| | | | | | | becoming moist from 3-5'. wet @ 5' | 2-4' VOC sample 4-6' VOC sample |
| 650 | 5 | | 70 | 21 | ML | Clayey SILT: reddish yellow (7.5YR, 6/6), some sand, fine, dry | |
| | | | 20 | 5.1 | | | |
| | | | 25 | 5.3 | | | |
| | 10 | | | | | | 10-12' VOC sample |
| | | | 35 | 9.4 | GM | Silty GRAVEL: pink (7.5YR, 7/4), well graded limestone gravel, angular, silty, dry | |
| | | | 35 | 6.4 | | | 12-14' VOC sample |
| 640 | 15 | | 35 | 5.7 | | more gravel present (40%), increasing clay | |
| | | | 50 | 7.1 | | | 16-18' VOC sample |
| | | | 60 | 4.8 | | | |
| | 20 | | 80 | 4.7 | CL | Silty CLAY: reddish yellow (5YR, 6/6), slightly sandy, trace of limestone gravel, medium stiff, moist | |
| | | | 60 | 4.3 | | | |
| 630 | 25 | | 75 | 4.1 | | calcareous nodules from 25-26.5' | |
| | | | 100 | 4.7 | | yellowish brown (10YR, 5/8), medium stiff, moist | |
| | | | 80 | 4.3 | | | |
| | 30 | | | | | light gray (10YR, 7/2), poorly graded, minor subrounded-angular limestone gravel, trace fine sand, wet @ 30'. | |
| | | | 50 | 4.6 | | | |
| | | | | | | END OF BORING @ 32' | Auger Refusal |
| | 35 | | | | | | |

Project: SPH PILOT TEST
Project Location: AIR FORCE PLANT 4, FORT WORTH, TX
Project Number: 80480009
Log of Boring TMP 3

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|---|--------------------------|-----------|
| Date(s) Drilled | 05/01/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 32.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 654.99 |
| Groundwater Level(s) | 32.0' ; 5/1/2000 | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See TMP completion | Comments | Borehole for temperature monitoring point | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|--|-------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| | 0 | | | | Con Fill | Concrete Silty GRAVEL: very pale brown (10YR 7/3), well graded, angular limestone gravel, moist. | |
| | | | 5 | 6.3 | | | Fill Material |
| | | | 20 | 24.0 | | | 2-4' VOC sample |
| 650 | 5 | | 0 | 16.2 | ML | Clayey SILT: reddish yellow (7.5 YR 6/6), 30% limestone gravel, subangular, moist. ↙ slightly plastic, moist to dry | |
| | | | 40 | 37 | | | 6-8' VOC sample |
| | | | 80 | 7.4 | | ↙ minor medium sand, loose, dry | |
| | 10 | | 40 | 5.6 | | | |
| | | | 40 | 5.0 | | | |
| 640 | 15 | | 40 | 5.6 | | ↙ @16' becomes strong brown (7.5 YR 5/8), moist, minor angular limestone gravel | |
| | | | 90 | 5.2 | | | |
| | | | 90 | 4.3 | SM | Gravelly SAND: reddish yellow (7.5 YR 6/6), silty, well graded, loose, moist. | |
| | 20 | | 90 | 4.2 | ML | Clayey SILT: yellowish red (5 YR 5/6), minor limestone gravel, medium stiff, moist. | |
| | | | 60 | 4.6 | | ↙ soft | |
| 630 | 25 | | 50 | 7.0 | | | 24-26' VOC sample |
| | | | 75 | 4.6 | CL | Silty CLAY: yellowish red (5 YR 5/6), stiff, minor angular limestone gravel, moist. | |
| | | | 80 | 17.6 | | ↙ @29' becomes olive yellow (2.5 YR 6/6), sandy, gravelly silty clay, medium stiff | 28-30' VOC sample |
| | 30 | | 80 | 27.2 | | | 30-32' VOC sample |
| | | | | | | END OF BORING @ 32' | Auger Refusal |
| 620 | 35 | | | | | | |

Report: _12AS_CLEVELAND-4-USCS; Project File: H:\PROJECTS\WC_USERS\ACTIVE-1\GINT_P-1\PROJECT\...P#4.GPJ; Data Template: WC-CORP2.GDT Printed: 11/15/00

URS

Project: SPH PILOT TEST
Project Location: AIR FORCE PLANT 4, FORT WORTH, TX
Project Number: 80480009
Log of Boring TMP 4

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|---|--------------------------|-----------|
| Date(s) Drilled | 05/02/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 32.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 655.24 |
| Groundwater Level(s) | 29.93' ; 5/2/2000 | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See TMP completion | Comments | Borehole for temperature monitoring point | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|---------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| | 0 | | 25 | 4.1 | Con Fill | Concrete Silty GRAVEL: very pale brown (10 YR 7/3), well graded, angular-subrounded limestone gravel, dry. | Fill Material |
| | | | 40 | 4.7 | | | |
| | | | 50 | 5.9 | ML | Clayey SILT: reddish yellow (7.5 YR 6/6), some fine sand, slightly plastic, dry to moist, wood debris @ 5'. | |
| | | | 75 | 5.1 | | | |
| 650 | 5 | | 100 | 5.2 | | becomes pink (7.5 YR 7/4), medium stiff, moist, homogeneous, cohesive | |
| | | | 50 | 5.2 | | medium stiff to stiff, moist | |
| | | | 75 | 4.5 | | | |
| 640 | 15 | | 100 | 4.4 | | becomes reddish yellow (5 YR 6/6), stiff to hard | |
| | | | 100 | 4.7 | | | |
| | | | 80 | 4.7 | ML | Clayey SILT: strong brown (7.5 YR 5/8), slightly plastic, moist, minor angular limestone gravel. | |
| | | | 40 | 4.5 | | | |
| | | | 100 | 5.0 | | becomes yellowish red (5 YR 5/6), soft, moist, minor limestone gravel | |
| 630 | 25 | | 80 | 4.5 | | calcareous nodules from 25' to 26', medium stiff @ 28' | |
| | | | 100 | 4.8 | | | |
| | | | 90 | 4.8 | | calcareous nodules from 29' to 29.5', soft, moist | |
| | 30 | | 70 | 5.2 | GM | Silty GRAVEL: reddish yellow (7.5 YR 6/6), soft, 40% angular limestone gravel, wet @30' | |
| | | | | | CL | Silty CLAY: reddish yellow (7.5 YR 6/6), stiff | |
| | | | | | | END OF BORING @ 32' | Auger Refusal |
| | 35 | | | | | | |

Project: SPH PILOT TEST**Project Location: AIR FORCE PLANT 4, FORT WORTH, TX****Project Number: 80480009****Log of Boring VR1 S/D**

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|---|--------------------------|-----------|
| Date(s) Drilled | 04/27/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 25.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 655.11 |
| Groundwater Level(s) | NA | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See VRW completion | | Comments Borehole for vapor recovery well | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|---|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 655 | 0 | | 60 | 5.4 | Con Fill | Concrete Silty GRAVEL: light grey (5YR, 7/2), soft, moist, angular, well graded | Fill Material Breathing Zone = 3.4 ppm |
| | | | 70 | 5.2 | | | |
| | | | 70 | 9999+ | | | |
| 650 | 5 | | 70 | 360 | ML | Clayey SILT: brownish yellow (10YR, 6/8), moist, slight plasticity, fine sand, strong solvent odor ↙ increasingly finer sand | Breathing Zone = 13.6 ppm |
| | | | 70 | 317 | | | |
| | | | 100 | 290 | ML | Clayey SILT: reddish yellow (7.5YR, 6/8), moist, fine sand, slight solvent odor | |
| 645 | 10 | | 100 | 250 | | | Breathing Zone = 6.2 ppm |
| | | | 100 | 138 | | ↙ increasing clay content | |
| | | | 100 | 32 | | | |
| 640 | 15 | | 100 | 21.3 | ML | Clayey SILT: reddish yellow (7.5YR, 6/8), medium stiff-stiff, minor angular gravel, dry to moist | Breathing Zone = 3.4 ppm |
| | | | 90 | 81.3 | | | |
| | | | 90 | --- | | ↙ 40 % subrounded gravel, moist | |
| 635 | 20 | | 90 | 76.2 | | | END OF BORING @ 25' |
| | | | | | | | |
| | | | | | | | |
| 630 | 25 | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | 30 | | | | | | |

URS

Report: 12AS_CLEVELAND+USCS; Project File: H:\PROJECTS\WC_USERS\ACTIVE-1\GINT_P-1\PROJECTS_P-14.GPJ; Data Template: WC-CORP2.GDT Printed: 11/15/00

Project Number: 80480009

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|----------------------------------|--------------------------|-----------|
| Date(s) Drilled | 04/28/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 25.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 655.18 |
| Groundwater Level(s) | NA | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See VRW completion | Comments | Borehole for vapor recovery well | | |

[illegible]

Project Number: 80480009

Log of Boring VR3 S/D

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|----------------------------------|--------------------------|-----------|
| Date(s) Drilled | 04/18/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 25.0 feet |
| Drill Rig Type | B-61 | Drill Bit Size/Type | 12" | Ground Surface Elevation | 655.12 |
| Groundwater Level(s) | NA | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See VRW completion | Comments | Borehole for vapor recovery well | | |

[illegible]

Report: _12AS_CLEVELAND+/USCS; Project File: H:\PROJECTS\WC_USERS\ACTIVE-1\GINT_P-1\PROJECTS_..r#4.GPJ; Data Template:WC-CORP2.GDT Printed: 11/15/00

URS

Project Number: 80480009

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|----------------------------------|--------------------------|-----------|
| Date(s) Drilled | 04/27/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 25.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 655.03 |
| Groundwater Level(s) | NA | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See VRW completion | Comments | Borehole for vapor recovery well | | |

[illegible]

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring VR5 S

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|----------------|----------------------------------|----------|
| Date(s) Drilled | 04/27/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 9.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 654.98 |
| Groundwater Level(s) | NA | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See VRW completion | | Comments | Borehole for vapor recovery well | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|--|--------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| | 0 | | | | Con | Concrete | |
| | 1 | | 50 | 20 | Fill | Gravelly SILT: pinkish grey (7.5 YR 6/2), well graded, angular gravel, moist | |
| | 2 | | | | | | Fill Material |
| | 3 | | 60 | 12.6 | | | |
| | 4 | | | | ML | Clayey SILT: reddish yellow (7.5 YR 6/6), minor fine sand, moist, medium stiff, slight solvent odor. | Breathing zone = 3.4 ppm |
| 650 | 5 | | 60 | 575 | | | |
| | 6 | | | | | | |
| | 7 | | 80 | 2066 | | | |
| | 8 | | | | | | |
| | 9 | | | | | END OF BORING @ 9' | |
| 645 | 10 | | | | | | |
| | 11 | | | | | | |
| | 12 | | | | | | |
| | 13 | | | | | | |
| | 14 | | | | | | |
| 640 | 15 | | | | | | |

Report: _12AS_CLEVELAND+JUSCS; Project File: H:\PROJECTS\WC_USERS\ACTIVE-1\GINT_P-1\PROJECTS...r#4.GPJ; Data Template: WC-CORP2.GDT Printed: 11/15/00

URS

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring VR6 S

Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|---|--------------------------|----------|
| Date(s) Drilled | 04/28/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 9.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 655.13 |
| Groundwater Level(s) | NA | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See VRW completion | | Comments Borehole for vapor recovery well | | |

| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|---|--------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 655 | 0 | | | | Con | Concrete | |
| | 1 | | 70 | 3.2 | Fill | Gravelly SILT: pale brown (10 YR 6/3), medium stiff, well graded, angular limestone gravel, moist | |
| | 2 | | | | | | Fill Material |
| | 3 | | 80 | 12.6 | | | |
| | 4 | | | | | | |
| 650 | 5 | | 80 | 34.7 | | | Breathing zone ppm |
| | 6 | | | | | | |
| | 7 | | 80 | 29.6 | | becoming soft, 30% limestone gravel | |
| | 8 | | | | | | |
| | 9 | | | | | END OF BORING @ 9' | |
| 645 | 10 | | | | | | |
| | 11 | | | | | | |
| | 12 | | | | | | |
| | 13 | | | | | | |
| | 14 | | | | | | |
| | 15 | | | | | | |

Project: SPH PILOT TEST

Project Location: AIR FORCE PLANT 4, FORT WORTH, TX

Project Number: 80480009

Log of Boring VR7 S

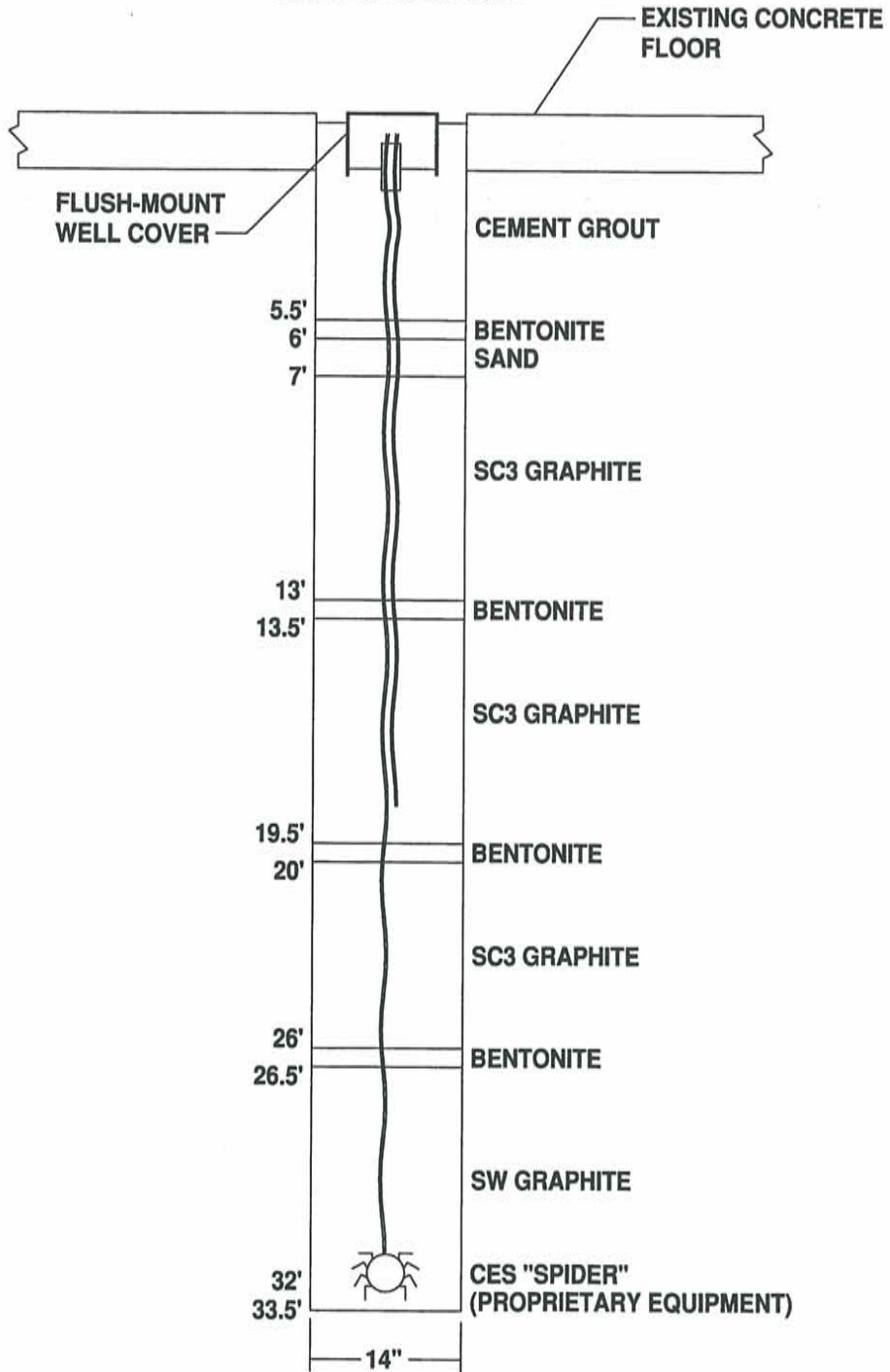
Sheet 1 of 1

| | | | | | |
|----------------------|--------------------|---------------------|---|--------------------------|----------|
| Date(s) Drilled | 04/28/2000 | Logged By | Lynn Schaub | Reviewed By | MSM |
| Drilling Method | HSA | Drilling Contractor | Geoprojects | Total Depth of Borehole | 9.0 feet |
| Drill Rig Type | CME-75 | Drill Bit Size/Type | 8" | Ground Surface Elevation | 655.00 |
| Groundwater Level(s) | NA | Sampling Method | 2' Split Spoon | Hammer Data | NA |
| Borehole Backfill | See VRW completion | | Comments Borehole for vapor recovery well | | |

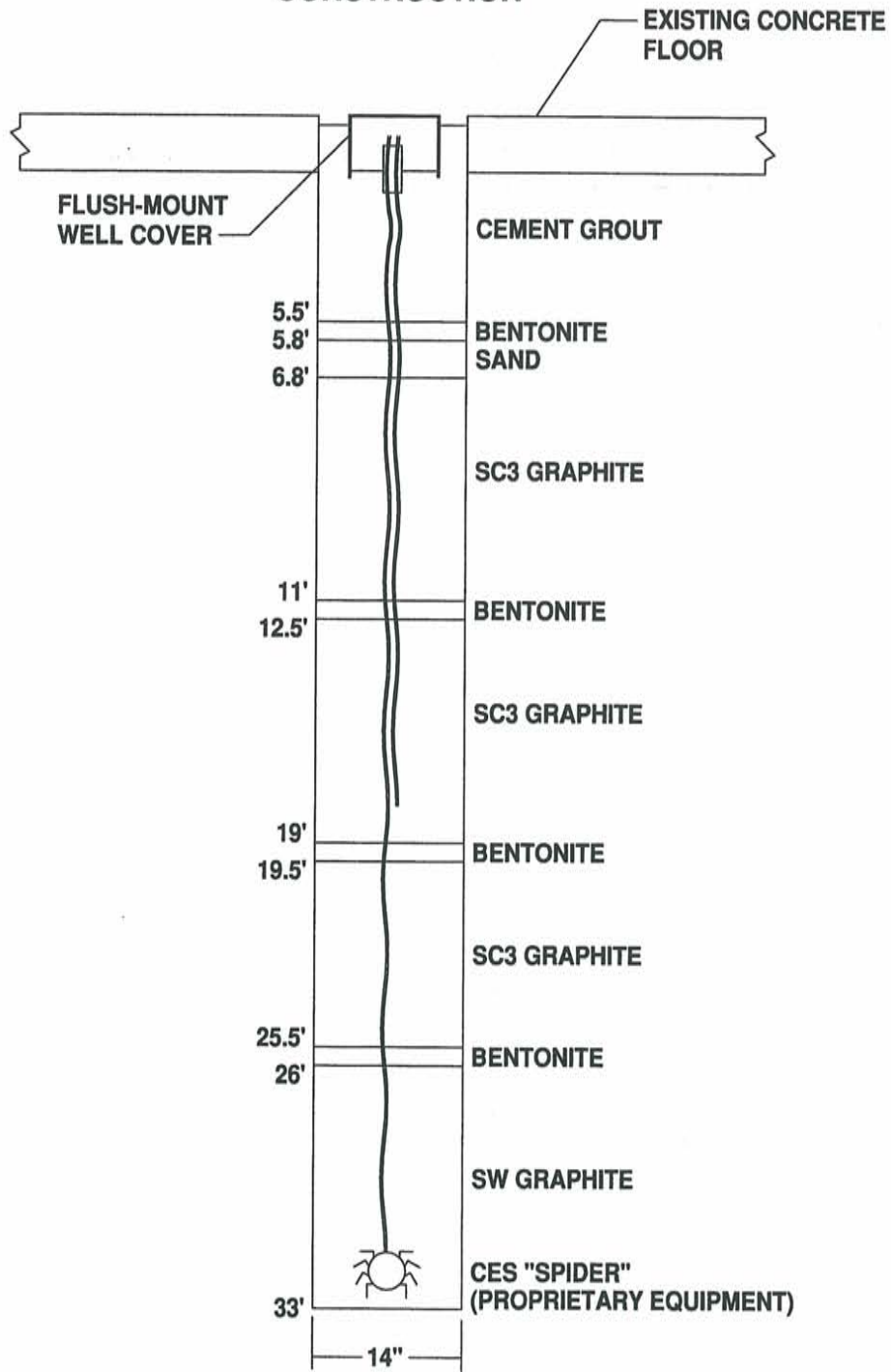
| Elevation, feet | Downhole Depth, feet | SAMPLES | | | USCS Symbol | MATERIAL DESCRIPTION | FIELD NOTES |
|-----------------|----------------------|---------|-------------|----------------|-------------|--|--------------------------|
| | | Type | Recovery, % | PID Scan (ppm) | | | |
| 655 | 0 | | | | Con | Concrete | |
| | 1 | | 100 | 4.8 | Fill | Silty GRAVEL: light grey (10 YR 7/2), well graded, subangular limestone gravel, moist | Fill Material |
| | 2 | | | | | | |
| | 3 | | 100 | 39.4 | | | |
| | 4 | | | | | | |
| 650 | 5 | | 100 | 98.6 | | | Breathing zone = 3.2 ppm |
| | 6 | | | | ML | Clayey SILT: light brown (7.5 YR 6/4), minor subangular limestone gravel, moist, slight solvent odor | |
| | 7 | | 100 | 78.2 | | | |
| | 8 | | | | | | |
| | 9 | | | | | END OF BORING @ 9' | |
| 645 | 10 | | | | | | |
| | 11 | | | | | | |
| | 12 | | | | | | |
| | 13 | | | | | | |
| | 14 | | | | | | |
| 640 | 15 | | | | | | |

URS

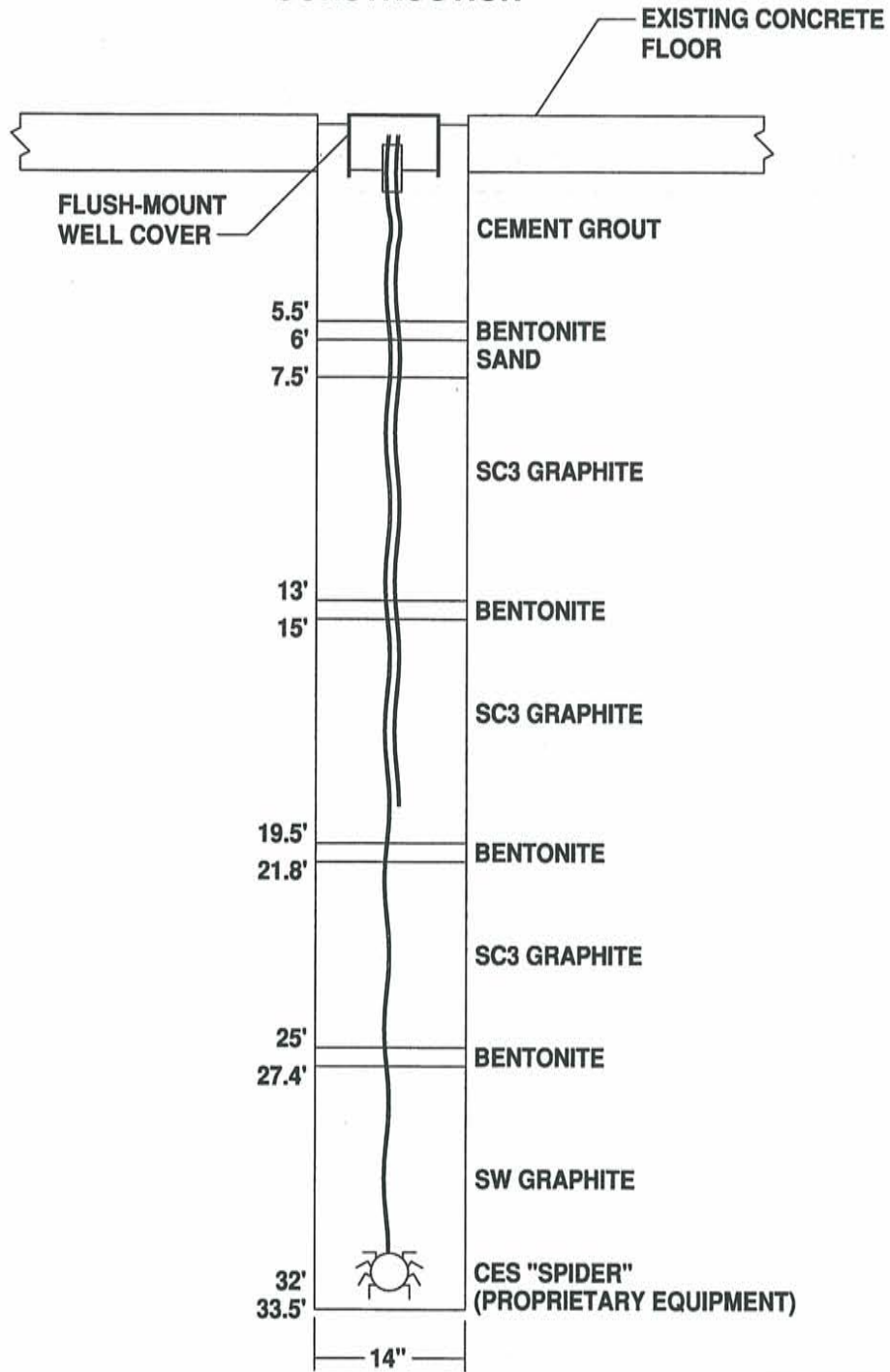
SPH ELECTRODE E1 CONSTRUCTION



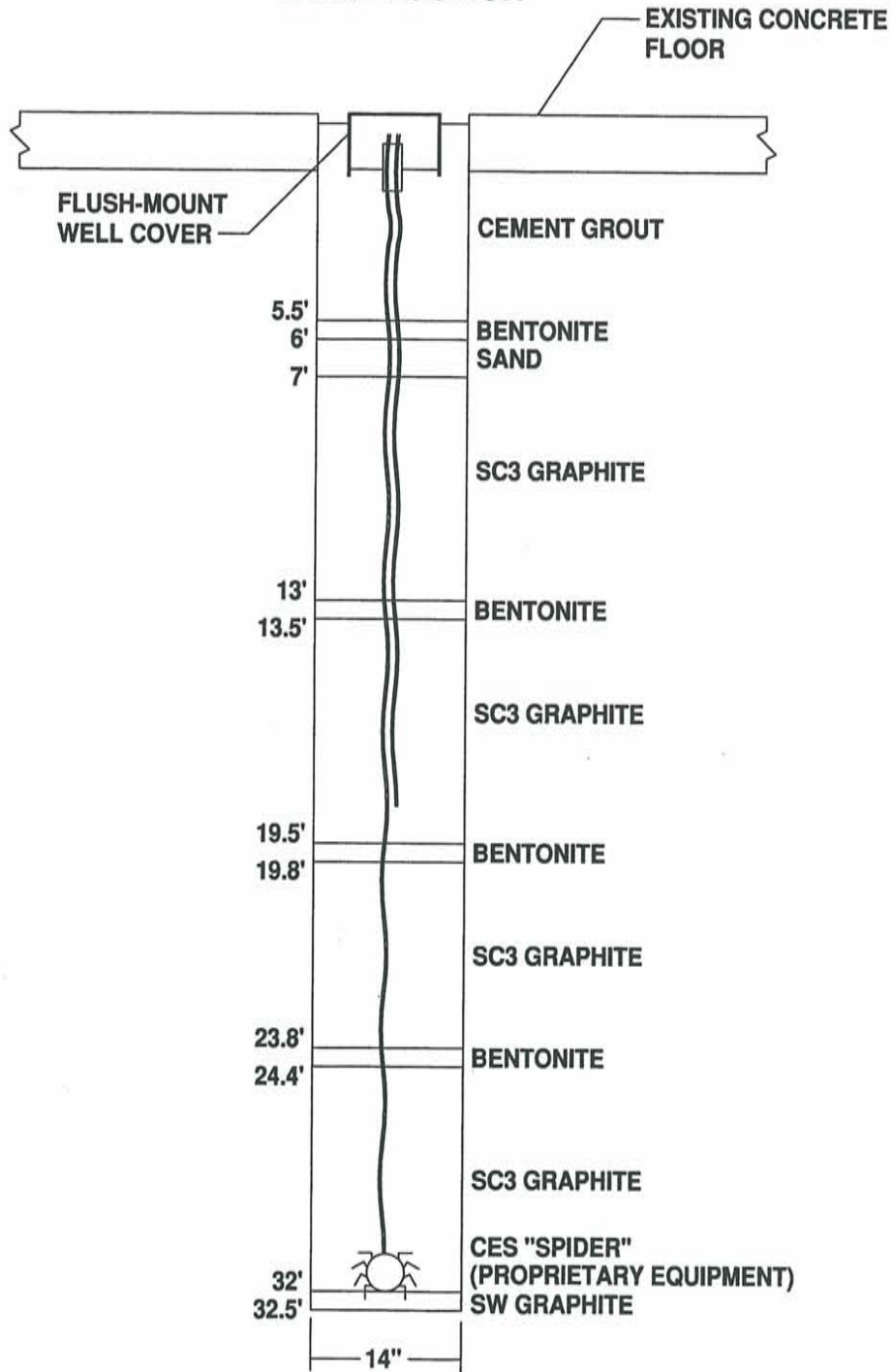
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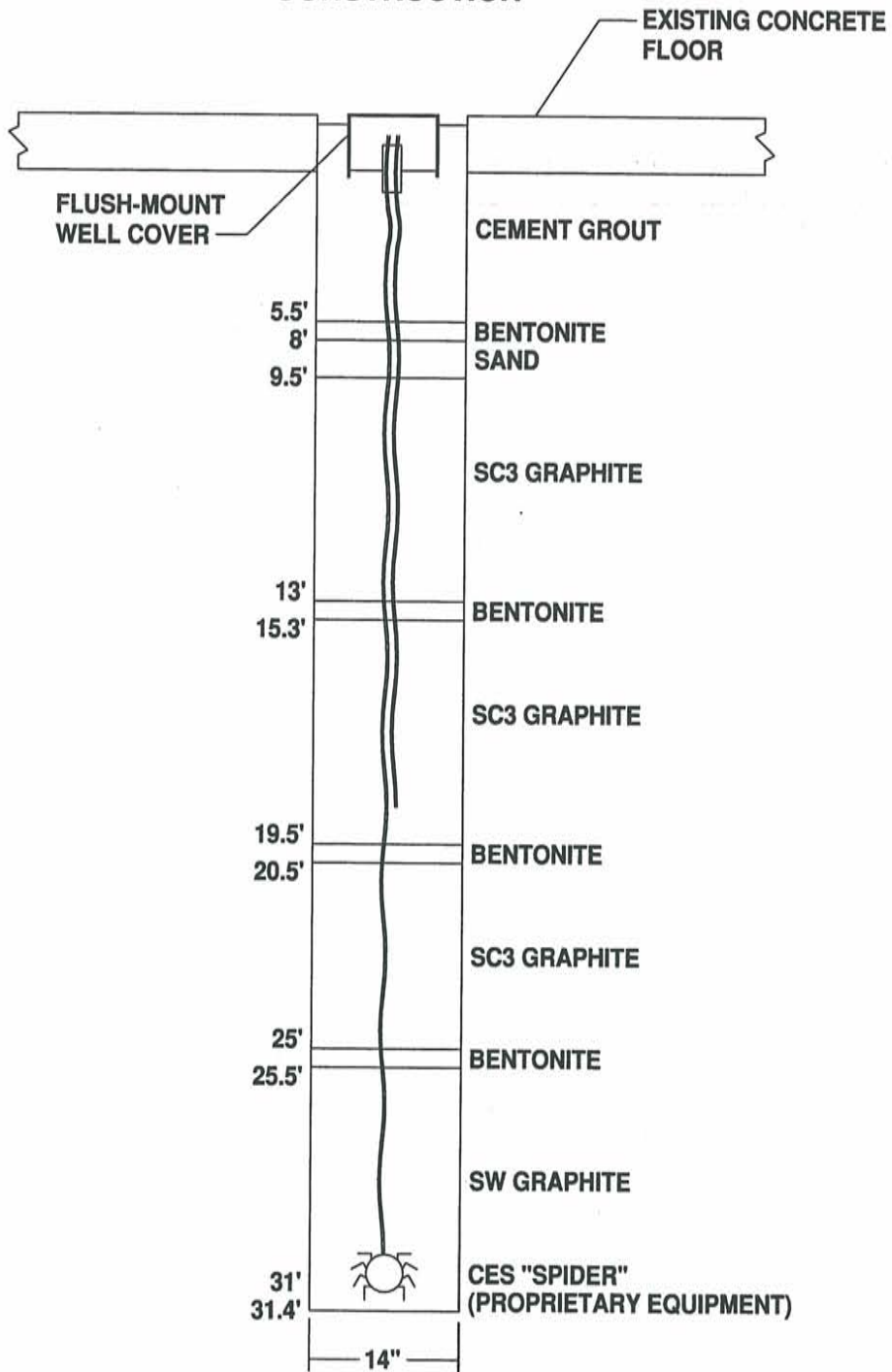
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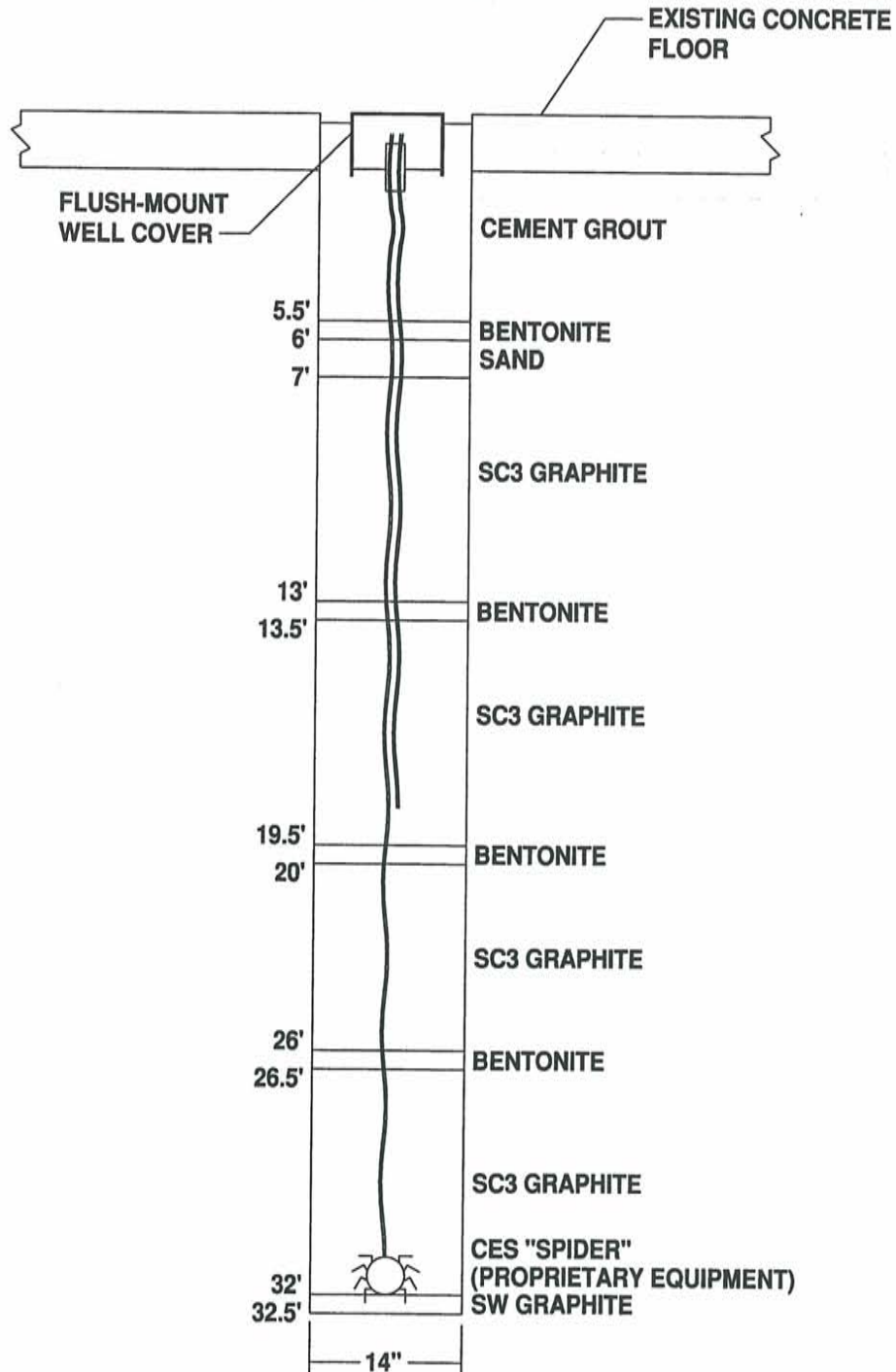
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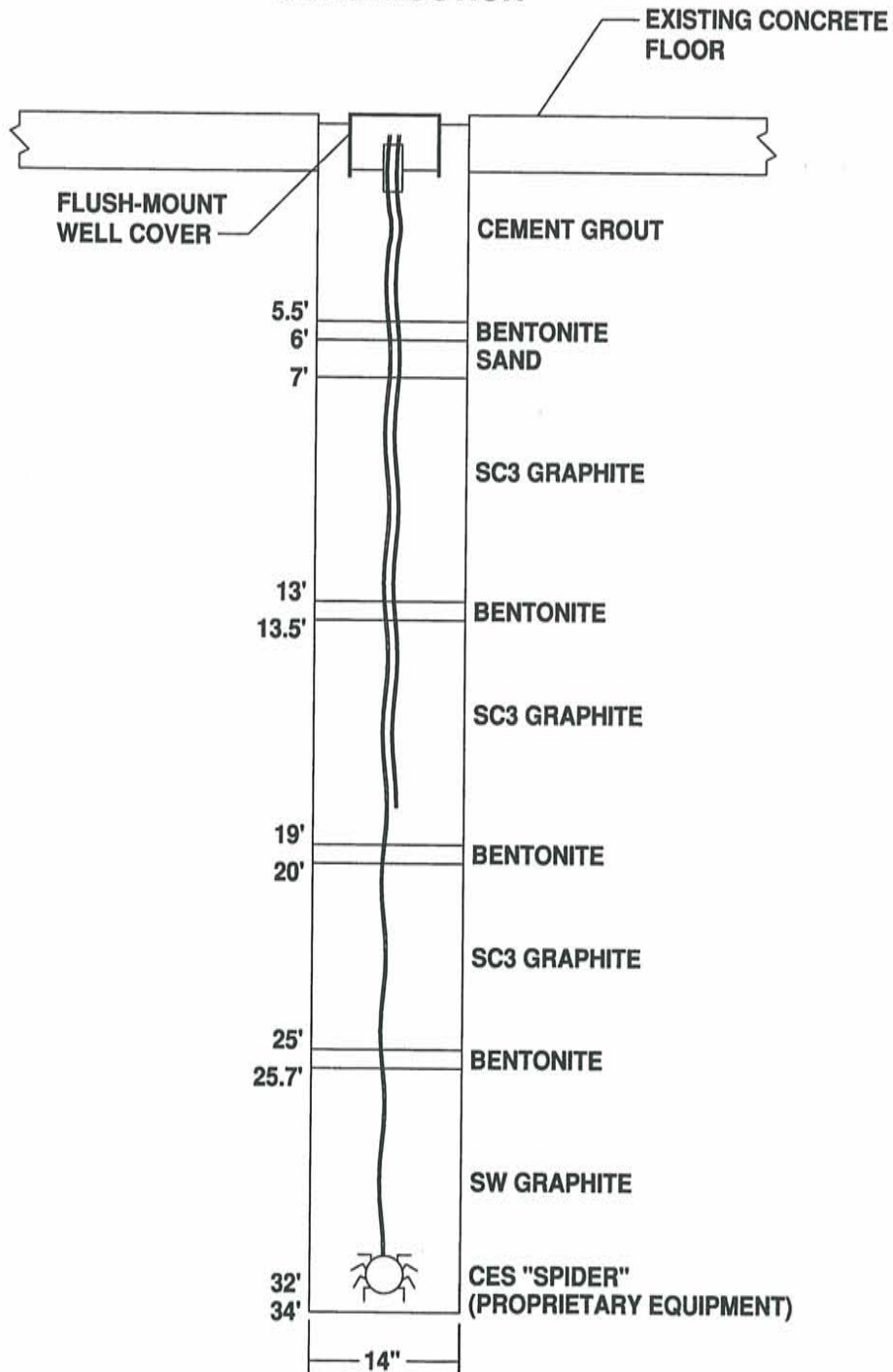
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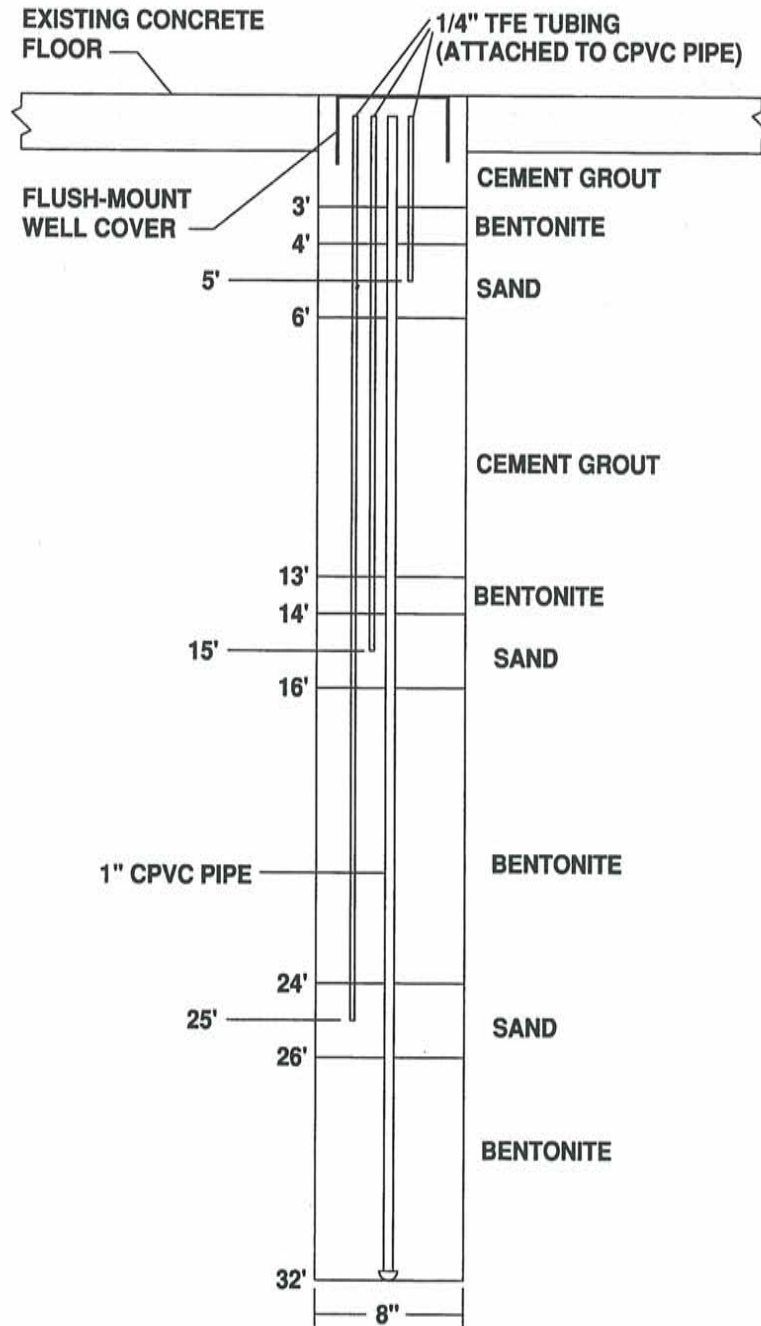
SPH ELECTRODE E6 CONSTRUCTION



SPH ELECTRODE E7 CONSTRUCTION

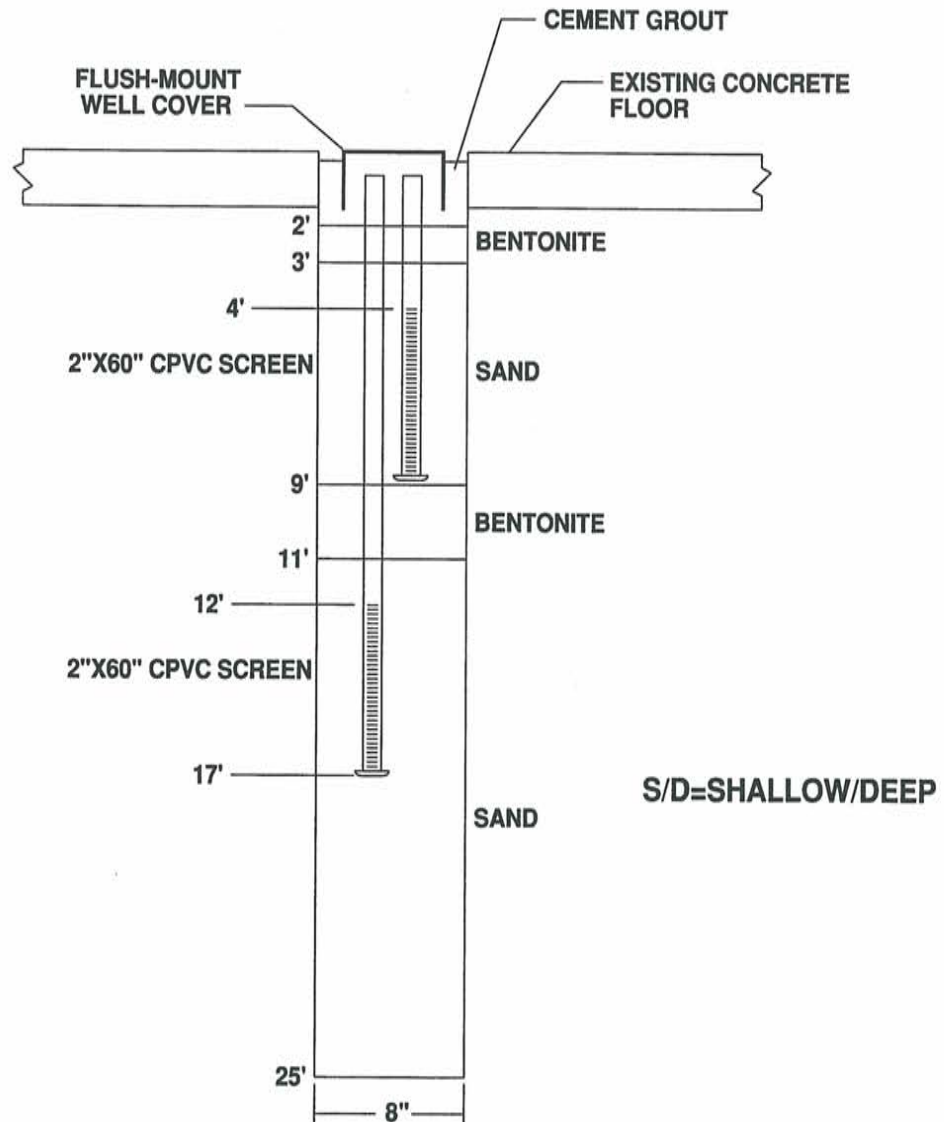


TEMPERATURE MONITORING POINT (TMP)
CONSTRUCTION
TMP1, TMP2, TMP3, & TMP4

**URS**

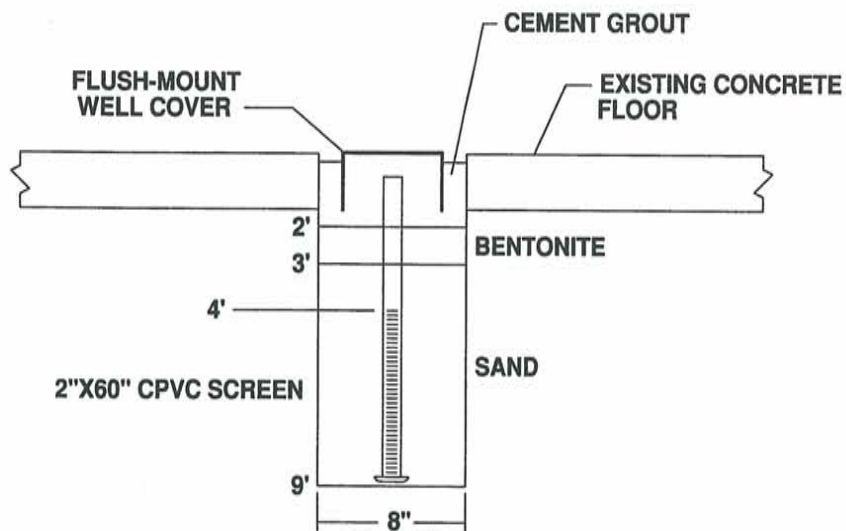
VAPOR RECOVERY (VR) WELL CONSTRUCTION

VAPOR WELL TYPE S/D VR1, VR2, VR3, & VR4



VAPOR RECOVERY (VR) WELL CONSTRUCTION

VAPOR WELL TYPE S VR5, VR6, & VR7



S=SHALLOW

URS

Appendix B
State of Texas Well Reports

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse Side

State of Texas WELL REPORT

1) OWNER USAF/LMTAS ADDRESS P.O. BOX 748 FORT WORTH TX 76101
(NAME) (Street or RFD) (City) (State) (Zip)

2) ADDRESS OF WELL:
County TARRANT AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX 76108 STATE GRID # 32-13-8
(Street or RFD) (City) (State) (Zip)

3) TYPE OF WORK (Check):

☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):

☒ Monitor ☐ Environmental Soil Boring ☐ Domestic
☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5)

6) WELL LOG:

E1

Date Drilling

Started: 4/25 19 2000

Completed: 4/25 19 2000

DIAMETER OF HOLE

| Dia. (in.) | From (ft.) | To (ft.) |
|------------|------------|----------|
| 14 | 0 | 33.6 |

7) DRILLING METHOD (Check):

☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HOLLOW STEM AUGER

| From(ft.) | To(ft.) | Description and color of formation material |
|-----------|---------|---|
| 0 | .3 | CONCRETE |
| .3 | 5 | GRAVELLY SILT, PALE BROWN |
| 5 | 15 | SILTY CLAY, REDDISH YELLOW |
| 8 | 25 | CLAYEY SILT, YELLOWISH RED |
| 21.8 | 33.6 | SANDY GRAVEL, YELLOWISH RED |

8) Borehole Completion (Check):

☐ Open Hole ☐ Straight Wall
☐ Underreamed ☒ Gravel Packed ☐ Other
If gravel packed give interval ... from 6 ft. to 7 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen |
|------------|-------------|--|---------------|------|---------------------|
| | | | From | To | |
| 0.5 | | TEMPERATURE ELECTRODE | 0.0 | 16.5 | |
| 0.5 | | "SPIDER" PROBE | 0.0 | 32.0 | |

9) CEMENTING DATA [RULE 338.44(1)]

Cemented from 0 ft. to 5.5 ft. No. of sacks used 3
Bentonite from 5.5 ft. to 6 ft. & 13 ft. to 13.5 ft.
Bentonite from 19.5 ft. to 21 ft. & 26 ft. to 26.5 ft.
Graphite from 7 ft. to 13 ft. & 13.5 ft. to 19.5 ft.
Graphite from 20 ft. to 26 ft. & 26.5 ft. to 32 ft.

13) TYPE PUMP: N/A

☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other

Depth to pump bowls, cylinder, jet, etc., ft.

14) WELL TESTS: N/A

Type test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated

Yield: gpm with ft. drawdown after hrs.

15) WATER QUALITY:

Did you knowingly penetrate any strata which contained undesirable constituents?

☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"

Type of water? Depth of strata

Was a chemical analysis made? ☐ Yes ☐ No

10) SURFACE COMPLETION

☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☒ Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL: N/A

Static level ft. below land surface Date
Artesian flow gpm. Date

12) PACKERS: N/A Type

Depth

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC.
(Type or print)

WELL DRILLER'S LICENSE NO. 54413M

ADDRESS 8834 CIRCLE DRIVE
(Street or RFD)

AUSTIN TX 78736
(City) (State) (Zip)

(Signed) ANTONIO LANDEROS
(Licensed Well Driller)

(Signed) _____
(Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC COPY

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse Side

State of Texas
WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

| 1) OWNER <u>USAF/LMTAS</u> ADDRESS <u>P.O. BOX 748</u> FORT WORTH TX 76101 (NAME) (Street or RFD) (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-----------------------|-------------|--|--|---------------|---------------------|---------------------|----|-----|--|-----------------------|-----|------|--|-----|--|----------------|-----|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 2) ADDRESS OF WELL: County <u>TARRANT</u> AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX 76108 STATE GRID # 32-13-8 (Street or RFD) (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3) TYPE OF WORK (Check): <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Deepening <input type="checkbox"/> Reconditioning <input type="checkbox"/> Plugging | 4) PROPOSED USE (Check): <input checked="" type="checkbox"/> Monitor <input type="checkbox"/> Environmental Soil Boring <input type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Irrigation <input type="checkbox"/> Injection <input type="checkbox"/> Public Supply <input type="checkbox"/> De-watering <input type="checkbox"/> Testwell If Public Supply well, were plans submitted to the TNRC ? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6) WELL LOG: <u>E3</u> Date Drilling _____ Started: <u>4/27</u> 19 <u>2000</u> Completed: <u>4/27</u> 19 <u>2000</u> | 7) DRILLING METHOD (Check): <input type="checkbox"/> Driven <input type="checkbox"/> Air Rotary <input type="checkbox"/> Mud Rotary <input type="checkbox"/> Bored <input type="checkbox"/> Air Hammer <input type="checkbox"/> Cable Tool <input type="checkbox"/> Jetted <input checked="" type="checkbox"/> Other <u>HOLLOW STEM AUGER</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5) _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8) Borehole Completion (Check): <input type="checkbox"/> Open Hole <input type="checkbox"/> Straight Wall <input type="checkbox"/> Underreamed <input checked="" type="checkbox"/> Gravel Packed <input type="checkbox"/> Other _____ If gravel packed give interval ... from <u>6</u> ft. to <u>7.5</u> ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Casing, Blank Pipe, and Well Screen Data: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Dia. (in.)</th> <th rowspan="2">New or Used</th> <th rowspan="2">Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial</th> <th colspan="2">Setting (ft.)</th> <th rowspan="2">Gage Casting Screen</th> </tr> <tr> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td>0.5</td> <td></td> <td>TEMPERATURE ELECTRODE</td> <td>0.0</td> <td>16.5</td> <td></td> </tr> <tr> <td>0.5</td> <td></td> <td>"SPIDER" PROBE</td> <td>0.0</td> <td>32</td> <td></td> </tr> <tr> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen | From | To | 0.5 | | TEMPERATURE ELECTRODE | 0.0 | 16.5 | | 0.5 | | "SPIDER" PROBE | 0.0 | 32 | | | | | | | | | | | | | | | | | | | |
| Dia. (in.) | New or Used | | | | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | From | To | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.5 | | TEMPERATURE ELECTRODE | 0.0 | 16.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.5 | | "SPIDER" PROBE | 0.0 | 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9) CEMENTING DATA [RULE 338.44(1)] Cemented from <u>0</u> ft. to <u>5.5</u> ft. No. of sacks used <u>3</u> Bentonite from <u>5.5</u> ft. to <u>6</u> ft. & <u>13</u> ft. to <u>15</u> ft. Bentonite from <u>19.5</u> ft. to <u>21.8</u> ft. & <u>25</u> ft. to <u>27.4</u> ft. Graphite from <u>7.5</u> ft. to <u>13</u> ft. & <u>15</u> ft. to <u>19.5</u> ft. Graphite from <u>21.8</u> ft. to <u>25</u> ft. & <u>27.4</u> ft. to <u>33.5</u> ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10) SURFACE COMPLETION <input type="checkbox"/> Specified Surface Slab Installed [Rule 338.44(2)(A)] <input type="checkbox"/> Specified Steel Sleeve Installed [Rule 338.44(3)(A)] <input type="checkbox"/> Pitless Adapter Used [Rule 338.44(3)(b)] <input checked="" type="checkbox"/> Approved Alternative Procedure Used [Rule 338.71] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11) WATER LEVEL: N/A Static level _____ ft. below land surface Date _____ Artesian flow _____ gpm. Date _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12) PACKERS: N/A Type _____ Depth _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13) TYPE PUMP: N/A <input type="checkbox"/> Turbine <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Cylinder <input type="checkbox"/> Other _____ Depth to pump bowls, cylinder, jet, etc., _____ ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14) WELL TESTS: N/A Type test: <input type="checkbox"/> Pump <input type="checkbox"/> Bailer <input type="checkbox"/> Jetted <input type="checkbox"/> Estimated Yield: _____ gpm with _____ ft. drawdown after _____ hrs. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable constituents? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, submit "REPORT OF UNDESIRABLE WATER" Type of water? _____ Depth of strata _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| COMPANY NAME <u>GEOPROJECTS INTERNATIONAL INC.</u> WELL DRILLER'S LICENSE NO. <u>54413M</u> (Type or print) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ADDRESS <u>8834 CIRCLE DRIVE</u> AUSTIN TX 78736 (Street or RFD) (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Signed) <u>ANTONIO LANDEROS</u> (Licensed Well Driller) | (Signed) _____ (Registered Driller Trainee) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Please attach electric log, chemical analysis, and other pertinent information, if available.

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse SideState of Texas
WELL REPORTTexas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 91) OWNER USAF/LMTAS ADDRESS P.O. BOX 748 FORT WORTH TX 76101
(NAME) (Street or RFD) (City) (State) (Zip)2) ADDRESS OF WELL:
County TARRANT AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX 76108 STATE GRID # 32-13-8
(Street or RFD) (City) (State) (Zip)

3) TYPE OF WORK (Check):

☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):

☒ Monitor ☐ Environmental Soil Boring ☐ Domestic
☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC ? ☐ Yes ☐ No

5)

6) WELL LOG: E4

Date Drilling

Started: 4/19 19 2000Completed: 4/19 19 2000

DIAMETER OF HOLE

Dia. (in.) From (ft.) To (ft.)

14 0 34

7) DRILLING METHOD (Check):

☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HOLLOW STEM AUGER

From(ft.) To(ft.) Description and color of formation material

| | | |
|----|------|-----------------------------|
| 0 | .3 | CONCRETE |
| .3 | 5 | SILTY CLAY, LT. GRAY |
| 5 | 10 | CLAYEY SILT, LT. BROWN |
| 10 | 16 | GRAVELLY SAND, PINK |
| 16 | 30 | CLAYEY SILT, REDDISH YELLOW |
| 30 | 33.6 | GRAVELLY SILT W/CLAY |

8) Borehole Completion (Check):

☐ Open Hole ☐ Straight Wall
☐ Underreamed ☒ Gravel Packed ☐ Other
If gravel packed give interval ... from 6 ft. to 7.5 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen |
|---------------|-------------------|--|---------------|------|---------------------------|
| | | | From | To | |
| 0.5 | | TEMPERATURE ELECTRODE | 0.0 | 16.5 | |
| 0.5 | | "SPIDER" PROBE | 0.0 | 32 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

9) CEMENTING DATA [RULE 338.44(1)]

Cemented from 0 ft. to 5.5 ft. No. of sacks used 3
Bentonite from 5.5 ft. to 6 ft. & 13 ft. to 13.5 ft.
Bentonite from 19.5 ft. to 19.8 ft. & 23.8 ft. to 24.4 ft.
Graphite from 7 ft. to 13 ft. & 13.5 ft. to 19.5 ft.
Graphite from 19.8 ft. to 23.8 ft. & 24.4 ft. to 32.5 ft.13) TYPE PUMP: N/A☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other

Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: N/AType test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated

Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:

Did you knowingly penetrate any strata which contained undesirable constituents?

☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"

Type of water? _____ Depth of strata _____

Was a chemical analysis made? ☐ Yes ☐ No

10) SURFACE COMPLETION

☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☒ Approved Alternative Procedure Used [Rule 338.71]11) WATER LEVEL: N/AStatic level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____12) PACKERS: N/A Type _____ Depth _____

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC.
(Type or print)WELL DRILLER'S LICENSE NO. 2897MADDRESS 8834 CIRCLE DRIVE
(Street or RFD)AUSTIN TX 78736
(City) (State) (Zip)(Signed) AMADOR HINOJOSA
(Licensed Well Driller)(Signed) _____
(Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse SideState of Texas
WELL REPORTTexas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 91) OWNER USAF/LMTAS ADDRESS P.O. BOX 748 FORT WORTH TX 76101
(NAME) (Street or RFD) (City) (State) (Zip)2) ADDRESS OF WELL: County TARRANT AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX 76108 STATE GRID # 32-13-8
(Street or RFD) (City) (State) (Zip)

3) TYPE OF WORK (Check):

☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):

☒ Monitor ☐ Environmental Soil Boring ☐ Domestic
☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5)

6) WELL LOG: E5

Date Drilling

Started: 4/26 19 2000Completed: 4/26 19 2000

DIAMETER OF HOLE

| Dia. (in.) | From (ft.) | To (ft.) |
|------------|------------|----------|
| 14 | 0 | 31.4 |
| | | |
| | | |

7) DRILLING METHOD (Check):

☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HOLLOW STEM AUGER

From(ft.) To(ft.) Description and color of formation material

| | | |
|----|------|------------------------------|
| 0 | .3 | CONCRETE |
| .3 | 4 | SILTY GRAVEL, V. PALE BROWN |
| 4 | 9 | CLAYEY SILT, REDDISH YELLOW |
| 9 | 16 | SANDY GRAVEL, REDDISH YELLOW |
| 16 | 22 | CLAYEY SILT, STRONG BROWN |
| 22 | 27 | CLAYEY SILT, YELLOWISH RED |
| 27 | 31.4 | SILTY CLAY, YELLOWISH RED |

8) Borehole Completion (Check):

☐ Open Hole ☐ Straight Wall
☐ Underreamed ☒ Gravel Packed ☐ Other
If gravel packed give interval ... from 8 ft. to 9.5 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen |
|---------------|-------------------|--|---------------|------|---------------------------|
| | | | From | To | |
| 0.5 | | TEMPERATURE ELECTRODE | 0.0 | 16.5 | |
| 0.5 | | "SPIDER" PROBE | 0.0 | 31 | |
| | | | | | |
| | | | | | |

9) CEMENTING DATA [RULE 338.44(1)]

Cemented from 0 ft. to 5.5 ft. No. of sacks used 3
Bentonite from 5.5 ft. to 8 ft. & 13 ft. to 15.3 ft.
Bentonite from 19.5 ft. to 20.5 ft. & 25 ft. to 25.5 ft.
Graphite from 9.5 ft. to 13 ft. & 13.5 ft. to 19.5 ft.
Graphite from 20.5 ft. to 25 ft. & 25.5 ft. to 31.4 ft.13) TYPE PUMP: N/A☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other

Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: N/AType test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated

Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:

Did you knowingly penetrate any strata which contained undesirable constituents?

☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"

Type of water? _____ Depth of strata _____

Was a chemical analysis made? ☐ Yes ☐ No

10) SURFACE COMPLETION

☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☒ Approved Alternative Procedure Used [Rule 338.71]11) WATER LEVEL: N/AStatic level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____12) PACKERS: N/A Type _____ Depth _____

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC.
(Type or print)WELL DRILLER'S LICENSE NO. 54413MADDRESS 8834 CIRCLE DRIVE
(Street or RFD)AUSTIN TX 78736
(City) (State) (Zip)(Signed) ANTONIO LANDEROS
(Licensed Well Driller)(Signed) _____
(Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

TNRCC COPY

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse Side

State of Texas WELL REPORT

| 1) OWNER <u>USAF/LMTAS</u> ADDRESS <u>P.O. BOX 748</u> FORT WORTH TX <u>76101</u> (NAME) (Street or RFD) (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----------------------|-------------|--|--|---------------|---------------------|---------------------|----|-----|--|-----------------------|-----|------|--|-----|--|----------------|-----|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 2) ADDRESS OF WELL: County <u>TARRANT</u> AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX <u>76108</u> STATE GRID # <u>32-13-8</u> (Street or RFD) (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3) TYPE OF WORK (Check): <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Deepening <input type="checkbox"/> Reconditioning <input type="checkbox"/> Plugging | 4) PROPOSED USE (Check): <input checked="" type="checkbox"/> Monitor <input type="checkbox"/> Environmental Soil Boring <input type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Irrigation <input type="checkbox"/> Injection <input type="checkbox"/> Public Supply <input type="checkbox"/> De-watering <input type="checkbox"/> Testwell If Public Supply well, were plans submitted to the TNRCC ? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6) WELL LOG: <u>E7</u> Date Drilling _____ Started: <u>4/26</u> 19 <u>2000</u> Completed: <u>4/26</u> 19 <u>2000</u> | 7) DRILLING METHOD (Check): <input type="checkbox"/> Driven <input type="checkbox"/> Air Rotary <input type="checkbox"/> Mud Rotary <input type="checkbox"/> Bored <input type="checkbox"/> Air Hammer <input type="checkbox"/> Cable Tool <input type="checkbox"/> Jetted <input checked="" type="checkbox"/> Other <u>HOLLOW STEM AUGER</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5) _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8) Borehole Completion (Check): <input type="checkbox"/> Open Hole <input type="checkbox"/> Straight Wall <input type="checkbox"/> Underreamed <input checked="" type="checkbox"/> Gravel Packed <input type="checkbox"/> Other _____ If gravel packed give interval ... from <u>6</u> ft. to <u>7</u> ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CASING, BLANK PIPE, AND WELL SCREEN DATA: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Dia. (in.)</th> <th rowspan="2">New or Used</th> <th rowspan="2">Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial</th> <th colspan="2">Setting (ft.)</th> <th rowspan="2">Gage Casting Screen</th> </tr> <tr> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td>0.5</td> <td></td> <td>TEMPERATURE ELECTRODE</td> <td>0.0</td> <td>16.5</td> <td></td> </tr> <tr> <td>0.5</td> <td></td> <td>"SPIDER" PROBE</td> <td>0.0</td> <td>32.0</td> <td></td> </tr> <tr> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen | From | To | 0.5 | | TEMPERATURE ELECTRODE | 0.0 | 16.5 | | 0.5 | | "SPIDER" PROBE | 0.0 | 32.0 | | | | | | | | | | | | | | | | | | | |
| Dia. (in.) | New or Used | | | | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | From | To | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.5 | | TEMPERATURE ELECTRODE | 0.0 | 16.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.5 | | "SPIDER" PROBE | 0.0 | 32.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9) CEMENTING DATA [RULE 338.44(1)] Cemented from <u>0</u> ft. to <u>5.5</u> ft. No. of sacks used <u>3</u> Bentonite from <u>5.5</u> ft. to <u>6</u> ft. & <u>13</u> ft. to <u>13.5</u> ft. Bentonite from <u>19</u> ft. to <u>20</u> ft. & <u>25</u> ft. to <u>25.7</u> ft. Graphite from <u>7</u> ft. to <u>13</u> ft. & <u>13.5</u> ft. to <u>19</u> ft. Graphite from <u>20</u> ft. to <u>25</u> ft. & <u>25.7</u> ft. to <u>34</u> ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10) SURFACE COMPLETION <input type="checkbox"/> Specified Surface Slab Installed [Rule 338.44(2)(A)] <input type="checkbox"/> Specified Steel Sleeve Installed [Rule 338.44(3)(A)] <input type="checkbox"/> Pitless Adapter Used [Rule 338.44(3)(b)] <input checked="" type="checkbox"/> Approved Alternative Procedure Used [Rule 338.71] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11) WATER LEVEL: N/A Static level _____ ft. below land surface Date _____ Artesian flow _____ gpm. Date _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12) PACKERS: N/A Type _____ Depth _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13) TYPE PUMP: N/A <input type="checkbox"/> Turbine <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Cylinder <input type="checkbox"/> Other _____ Depth to pump bowls, cylinder, jet, etc., _____ ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14) WELL TESTS: N/A Type test: <input type="checkbox"/> Pump <input type="checkbox"/> Bailer <input type="checkbox"/> Jetted <input type="checkbox"/> Estimated Yield: _____ gpm with _____ ft. drawdown after _____ hrs. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable constituents? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, submit "REPORT OF UNDESIRABLE WATER" Type of water? _____ Depth of strata _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC. WELL DRILLER'S LICENSE NO. 54413M
(Type or print)

ADDRESS 8834 CIRCLE DRIVE AUSTIN TX 78736
(Street or RFD) (City) (State) (Zip)

(Signed) ANTONIO LANDEROS (Signed) _____
(Licensed Well Driller) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse SideState of Texas
WELL REPORTTexas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 91) OWNER USAF/LMTAS ADDRESS P.O. BOX 748 FORT WORTH TX 76101
(NAME) (Street or RFD) (City) (State) (Zip)2) ADDRESS OF WELL:
County TARRANT AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX 76108 STATE GRID # 32-13-8
(Street or RFD) (City) (State) (Zip)

3) TYPE OF WORK (Check):

☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):

☒ Monitor ☐ Environmental Soil Boring ☐ Domestic
☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5)

6) WELL LOG: VR 1 S/D

Date Drilling

Started: 4/27 19 2000Completed: 4/27 19 2000

DIAMETER OF HOLE

Dia. (in.) From (ft.) To (ft.)

8 0 25

7) DRILLING METHOD (Check):

☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HOLLOW STEM AUGER

From(ft.) To(ft.) Description and color of formation material

0 .3 CONCRETE
.3 5 SILTY GRAVEL, LT. GRAY
6 10 CLAYEY SILT, BROWNISH YELLOW
21 30 CLAYEY SILT, REDDISH YELLOW

8) Borehole Completion (Check):

☐ Open Hole ☐ Straight Wall
☐ Underreamed ☒ Gravel Packed ☐ OtherIf gravel packed give interval ... from 4 ft. to 9 ft.If gravel packed give interval ... from 11 ft. to 25 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., If Commercial | Setting (ft.) | | Gage Casting Screen |
|---------------|-------------------|--|---------------|------|---------------------------|
| | | | From | To | |
| 2.0 | NEW | SCH 40 CPVC RISER | 0.0 | 4.0 | |
| 2.0 | NEW | SCH 40 CPVC RISER | 0.0 | 13.0 | |
| 2.0 | NEW | SCH 40 CPVC SCREEN | 4 | 9 | .010 |
| 2.0 | NEW | SCH 40 CPVC SCREEN | 13 | 17 | .010 |

9) CEMENTING DATA [RULE 338.44(1)]

Cemented from 0 ft. to 2 ft. No. of sacks used .36
Bentonite from 2 ft. to 3 ft. & 9 ft. to 11 ft.13) TYPE PUMP: N/A☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other

Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: N/AType test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated

Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:

Did you knowingly penetrate any strata which contained undesirable constituents?

☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"

Type of water? _____ Depth of strata _____

Was a chemical analysis made? ☐ Yes ☐ No

10) SURFACE COMPLETION

☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☒ Approved Alternative Procedure Used [Rule 338.71]11) WATER LEVEL: N/AStatic level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____12) PACKERS: N/A Type

Depth

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC.
(Type or print)WELL DRILLER'S LICENSE NO. 54413MADDRESS 8834 CIRCLE DRIVE
(Street or RFD)AUSTIN TX 78736
(City) (State) (Zip)(Signed) ANTONIO LANDEROS
(Licensed Well Driller)(Signed) _____
(Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse SideState of Texas
WELL REPORTTexas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 91) OWNER USAF/LMTAS ADDRESS P.O. BOX 748 FORT WORTH TX 76101
(NAME) (Street or RFD) (City) (State) (Zip)2) ADDRESS OF WELL:
County TARRANT AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX 76108 STATE GRID # 32-13-8
(Street or RFD) (City) (State) (Zip)

3) TYPE OF WORK (Check):

☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):

☒ Monitor ☐ Environmental Soil Boring ☐ Domestic
☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRC ? ☐ Yes ☐ No

5)

6) WELL LOG: VR 2 S/D

Date Drilling

Started: 4/28 19 2000Completed: 4/28 19 2000

DIAMETER OF HOLE

Dia. (in.) From (ft.) To (ft.)

8 0 25

7) DRILLING METHOD (Check):

☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HOLLOW STEM AUGER

From(ft.) To(ft.) Description and color of formation material

0 .3 CONCRETE
.3 5 CLAYEY SILT, PINK
5 8 SILTY CLAY, PINK
8 25 CLAYEY SILT, LT. BROWNISH YELLOW

8) Borehole Completion (Check):

☐ Open Hole ☐ Straight Wall
☐ Underreamed ☒ Gravel Packed ☐ Other
If gravel packed give interval ... from 4 ft. to 9 ft.
If gravel packed give interval ... from 11 ft. to 25 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen |
|---------------|-------------------|--|---------------|------|---------------------------|
| | | | From | To | |
| 2.0 | NEW | SCH 40 CPVC RISER | 0.0 | 4.0 | |
| 2.0 | NEW | SCH 40 CPVC RISER | 0.0 | 13.0 | |
| 2.0 | NEW | SCH 40 CPVC SCREEN | 4 | 9 | .010 |
| 2.0 | NEW | SCH 40 CPVC SCREEN | 13 | 17 | .010 |

9) CEMENTING DATA [RULE 338.44(1)]

Cemented from 0 ft. to 2 ft. No. of sacks used .36
Bentonite from 2 ft. to 3 ft. & 9 ft. to 11 ft.13) TYPE PUMP: N/A☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other

Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: N/AType test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated

Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:

Did you knowingly penetrate any strata which contained undesirable constituents?

☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"

Type of water? _____ Depth of strata _____

Was a chemical analysis made? ☐ Yes ☐ No

10) SURFACE COMPLETION

☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☒ Approved Alternative Procedure Used [Rule 338.71]11) WATER LEVEL: N/AStatic level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____12) PACKERS: N/A Type _____ Depth _____

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COMPANY NAME GEOPROJECTS INTERNATIONAL INC.
(Type or print)WELL DRILLER'S LICENSE NO. 54413MADDRESS 8834 CIRCLE DRIVE
(Street or RFD)AUSTIN TX 78736
(City) (State) (Zip)(Signed) ANTONIO LANDEROS
(Licensed Well Driller)(Signed) _____
(Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

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Privilege Notice on Reverse SideState of Texas
WELL REPORTTexas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 91) OWNER USAF/LMTAS ADDRESS P.O. BOX 748 FORT WORTH TX 76101
(NAME) (Street or RFD) (City) (State) (Zip)2) ADDRESS OF WELL: County TARRANT AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX 76108 STATE GRID # 32-13-8
(Street or RFD) (City) (State) (Zip)

3) TYPE OF WORK (Check):

☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):

☒ Monitor ☐ Environmental Soil Boring ☐ Domestic
☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5)

6) WELL LOG: VR 3 S/D

Date Drilling

Started: 4/18 19 2000Completed: 4/18 19 2000

DIAMETER OF HOLE

| Dia. (in.) | From (ft.) | To (ft.) |
|------------|------------|----------|
| 8 | 0 | 25 |
| | | |
| | | |

7) DRILLING METHOD (Check):

☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HOLLOW STEM AUGER

From(ft.) To(ft.) Description and color of formation material

| | | |
|----|----|----------------------------------|
| 0 | .3 | CONCRETE |
| .3 | 5 | SILTY CLAY, LT. GRAY-GRAYISH TAN |
| 5 | 10 | CLAYEY SILT, LT. BROWN |
| 10 | 17 | GRAVELLY SAND, PINK |
| 17 | 25 | CLAYEY SILT, REDDISH YELLOW |

8) Borehole Completion (Check):

☐ Open Hole ☐ Straight Wall
☐ Underreamed ☒ Gravel Packed ☐ OtherIf gravel packed give interval ... from 4 ft. to 9 ft.If gravel packed give interval ... from 11 ft. to 25 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen |
|---------------|-------------------|--|---------------|------|---------------------------|
| | | | From | To | |
| 2.0 | NEW | SCH 40 CPVC RISER | 0.0 | 4.0 | |
| 2.0 | NEW | SCH 40 CPVC RISER | 0.0 | 13.0 | |
| 2.0 | NEW | SCH 40 CPVC SCREEN | 4 | 9 | .010 |
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☐ Other

Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: N/AType test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated

Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:

Did you knowingly penetrate any strata which contained undesirable constituents?

☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"

Type of water? _____ Depth of strata _____

Was a chemical analysis made? ☐ Yes ☐ No

10) SURFACE COMPLETION

☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
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Artesian flow _____ gpm. Date _____12) PACKERS: N/A Type _____

Depth _____

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COMPANY NAME GEOPROJECTS INTERNATIONAL INC.
(Type or print)WELL DRILLER'S LICENSE NO. 2897MADDRESS 8834 CIRCLE DRIVE
(Street or RFD)AUSTIN TX 78736
(City) (State) (Zip)(Signed) AMADOR HINOJOSA
(Licensed Well Driller)(Signed) _____
(Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

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(Street or RFD) (City) (State) (Zip)

3) TYPE OF WORK (Check):

☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):

☒ Monitor ☐ Environmental Soil Boring ☐ Domestic
☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5)

6) WELL LOG: VR 4 S/D

Date Drilling

Started: 4/27 19 2000Completed: 4/27 19 2000

DIAMETER OF HOLE

Dia. (in.) From (ft.) To (ft.)

8 0 25

7) DRILLING METHOD (Check):

☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HOLLOW STEM AUGER

From(ft.) To(ft.) Description and color of formation material

| | | |
|----|----|-----------------------------|
| 0 | .3 | CONCRETE |
| .3 | 4 | SILTY GRAVEL, LT. GRAY |
| 4 | 6 | CLAYEY SILT, LT. BROWN |
| 6 | 17 | GRAVELLY SAND, PINK |
| 17 | 25 | CLAYEY SILT, REDDISH YELLOW |

8) Borehole Completion (Check):

☐ Open Hole ☐ Straight Wall
☐ Underreamed ☒ Gravel Packed ☐ OtherIf gravel packed give interval ... from 4 ft. to 9 ft.If gravel packed give interval ... from 11 ft. to 25 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen |
|---------------|-------------------|--|---------------|------|---------------------------|
| | | | From | To | |
| 2.0 | NEW | SCH 40 CPVC RISER | 0.0 | 4.0 | |
| 2.0 | NEW | SCH 40 CPVC RISER | 0.0 | 13.0 | |
| 2.0 | NEW | SCH 40 CPVC SCREEN | 4 | 9 | .010 |
| 2.0 | NEW | SCH 40 CPVC SCREEN | 13 | 17 | .010 |

9) CEMENTING DATA [RULE 338.44(1)]

Cemented from 0 ft. to 2 ft. No. of sacks used .36Bentonite from 2 ft. to 3 ft. & 9 ft. to 11 ft.13) TYPE PUMP: N/A☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other

Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: N/AType test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated

Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:

Did you knowingly penetrate any strata which contained undesirable constituents?

☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"

Type of water? _____ Depth of strata _____

Was a chemical analysis made? ☐ Yes ☐ No

10) SURFACE COMPLETION

☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]☐ Pitless Adapter Used [Rule 338.44(3)(b)]☒ Approved Alternative Procedure Used [Rule 338.71]11) WATER LEVEL: N/A

Static level _____ ft. below land surface Date _____

Artesian flow _____ gpm. Date _____

12) PACKERS: N/A Type _____ Depth _____

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC.
(Type or print)WELL DRILLER'S LICENSE NO. 54413MADDRESS 8834 CIRCLE DRIVE
(Street or RFD)AUSTIN TX 78736
(City) (State) (Zip)Signed) ANTONIO LANDEROS
(Licensed Well Driller)(Signed) _____
(Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

TNRCC COPY

| ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side | | State of Texas WELL REPORT | | Texas Water Well Drillers Advisory Council P.O. Box 12157 Austin, Tx. 78711 1 800 803 9202 EXT. 9 | | | | | | | | | | | | | |
|--|------------|--|--|--|------------|----------|---|---|---|--|--|--|--|--|--|--|--|
| 1) OWNER <u>USAF/LMTAS</u> ADDRESS <u>P.O. BOX 748</u> FORT WORTH TX 76101 | | (NAME) (Street or RFD) (City) (State) (Zip) | | | | | | | | | | | | | | | |
| 2) ADDRESS OF WELL: County <u>TARRANT</u> AIR FORCE PLANT 4, BLDG. 181 FORT WORTH TX 76108 STATE GRID # 32-13-8 | | (Street or RFD) (City) (State) (Zip) | | | | | | | | | | | | | | | |
| 3) TYPE OF WORK (Check): <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Deepening <input type="checkbox"/> Reconditioning <input type="checkbox"/> Plugging | | 4) PROPOSED USE (Check): <input checked="" type="checkbox"/> Monitor <input type="checkbox"/> Environmental Soil Boring <input type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Irrigation <input type="checkbox"/> Injection <input type="checkbox"/> Public Supply <input type="checkbox"/> De-watering <input type="checkbox"/> Testwell If Public Supply well, were plans submitted to the TNRCC ? <input type="checkbox"/> Yes <input type="checkbox"/> No | | 5) | | | | | | | | | | | | | |
| 6) WELL LOG: <u>VR6 S</u> Date Drilling Started: <u>4/28</u> 19 <u>2000</u> Completed: <u>4/28</u> 19 <u>2000</u> | | DIAMETER OF HOLE <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>Dia. (in.)</th> <th>From (ft.)</th> <th>To (ft.)</th> </tr> <tr> <td>8</td> <td>0</td> <td>9</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table> | | Dia. (in.) | From (ft.) | To (ft.) | 8 | 0 | 9 | | | | | | | 7) DRILLING METHOD (Check): <input type="checkbox"/> Driven <input type="checkbox"/> Air Rotary <input type="checkbox"/> Mud Rotary <input type="checkbox"/> Bored <input type="checkbox"/> Air Hammer <input type="checkbox"/> Cable Tool <input type="checkbox"/> Jetted <input checked="" type="checkbox"/> Other <u>HOLLOW STEM AUGER</u> | |
| Dia. (in.) | From (ft.) | To (ft.) | | | | | | | | | | | | | | | |
| 8 | 0 | 9 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| From(ft.) To(ft.) Description and color of formation material 0 .3 CONCRETE .3 9 GRAVELLY SILT, PALE BROWN | | 8) Borehole Completion (Check): <input type="checkbox"/> Open Hole <input type="checkbox"/> Straight Wall <input type="checkbox"/> Underreamed <input checked="" type="checkbox"/> Gravel Packed <input type="checkbox"/> Other _____ If gravel packed give interval ... from <u>3</u> ft. to <u>9</u> ft. | | | | | | | | | | | | | | | |
| CASING, BLANK PIPE, AND WELL SCREEN DATA: | | | | | | | | | | | | | | | | | |
| Dia. (in.) | | New or Used | | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | | | | | | | | | | | | | |
| Setting (ft.) | | From | | To | | | | | | | | | | | | | |
| 2 | | NEW | | SCH 40 CPVC RISER 0 4 | | | | | | | | | | | | | |
| 2 | | NEW | | SCH 40 CPVC SCREEN 4 9 .010 | | | | | | | | | | | | | |
| 9) CEMENTING DATA [RULE 338.44(1)] | | | | | | | | | | | | | | | | | |
| Cemented from <u>0</u> ft. to <u>2</u> ft. No. of sacks used <u>.34</u> | | | | | | | | | | | | | | | | | |
| Bentonite from <u>2</u> ft. to <u>3</u> ft. No. of sacks used <u>.5</u> | | | | | | | | | | | | | | | | | |
| Method used _____ | | | | | | | | | | | | | | | | | |
| Cemented by <u>ANTONIO LANDEROS</u> | | | | | | | | | | | | | | | | | |
| Distance to septic system field lines _____ ft. | | | | | | | | | | | | | | | | | |
| Method of verification of above distance _____ | | | | | | | | | | | | | | | | | |
| 10) SURFACE COMPLETION | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Specified Surface Slab Installed [Rule 338.44(2)(A)] | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Specified Steel Sleeve Installed [Rule 338.44(3)(A)] | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Pitless Adapter Used [Rule 338.44(3)(b)] | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Approved Alternative Procedure Used [Rule 338.71] | | | | | | | | | | | | | | | | | |
| 11) WATER LEVEL: N/A | | | | | | | | | | | | | | | | | |
| Static level _____ ft. below land surface | | | | Date _____ | | | | | | | | | | | | | |
| Artesian flow _____ gpm. | | | | Date _____ | | | | | | | | | | | | | |
| 12) PACKERS: N/A Type _____ Depth _____ | | | | | | | | | | | | | | | | | |
| 13) TYPE PUMP: N/A | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Turbine <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Cylinder | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Other _____ | | | | | | | | | | | | | | | | | |
| Depth to pump bowls, cylinder, jet, etc., _____ ft. | | | | | | | | | | | | | | | | | |
| 14) WELL TESTS: N/A | | | | | | | | | | | | | | | | | |
| Type test: <input type="checkbox"/> Pump <input type="checkbox"/> Bailer <input type="checkbox"/> Jetted <input type="checkbox"/> Estimated | | | | | | | | | | | | | | | | | |
| Yield: _____ gpm with _____ ft. drawdown after _____ hrs. | | | | | | | | | | | | | | | | | |
| 15) WATER QUALITY: | | | | | | | | | | | | | | | | | |
| Did you knowingly penetrate any strata which contained undesirable constituents? | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, submit "REPORT OF UNDESIRABLE WATER" | | | | | | | | | | | | | | | | | |
| Type of water? _____ Depth of strata _____ | | | | | | | | | | | | | | | | | |
| Was a chemical analysis made? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | | | | | | | | | | | | | | | |
| I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal. | | | | | | | | | | | | | | | | | |
| COMPANY NAME <u>GEOPROJECTS INTERNATIONAL INC.</u> | | WELL DRILLER'S LICENSE NO. <u>54413M</u> | | | | | | | | | | | | | | | |
| (Type or print) | | | | | | | | | | | | | | | | | |
| ADDRESS <u>8834 CIRCLE DRIVE</u> | | AUSTIN TX 78736 | | | | | | | | | | | | | | | |
| (Street or RFD) | | (City) (State) (Zip) | | | | | | | | | | | | | | | |
| (Signed) <u>ANTONIO LANDEROS</u> | | (Signed) _____ | | | | | | | | | | | | | | | |
| (Licensed Well Driller) | | (Registered Driller Trainee) | | | | | | | | | | | | | | | |
| Please attach electric log, chemical analysis, and other pertinent information, if available. | | | | | | | | | | | | | | | | | |

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

Please attach electric log, chemical analysis, and other pertinent information, if available.

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse Side

State of Texas
WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

1) OWNER USAF/LMTAS ADDRESS P.O. BOX 748 FORT WORTH TX 76101
(NAME) (Street or RFD) (City) (State) (Zip)

2) ADDRESS OF WELL:
County TARRANT AIR FORCE PLANT 4, BLDG. 181 FORT WORTH TX 76108 STATE GRID # 32-13-8
(Street or RFD) (City) (State) (Zip)

3) TYPE OF WORK (Check):

☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):

☐ Monitor ☒ Environmental Soil Boring ☐ Domestic
☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5)

6) WELL LOG:

PP1

Date Drilling

Started: 4/28 19 2000

Completed: 4/28 19 2000

DIAMETER OF HOLE

Dia. (in.) From (ft.) To (ft.)

8 0 7

7) DRILLING METHOD (Check):

☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HOLLOW STEM AUGER

N

From (ft.) To (ft.) Description and color of formation material

0 .3 CONCRETE
.3 7 CLAYEY SILT, LT. GRAY

8) Borehole Completion (Check): N/A ☐ Open Hole ☐ Straight Wall

☐ Underreamed ☐ Gravel Packed ☐ Other
If gravel packed give interval ... from _____ ft. to _____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA: N/A

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen |
|---------------|-------------------|--|---------------|----|---------------------------|
| | | | From | To | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

9) CEMENTING DATA [RULE 338.44(1)]

Cemented from 0 ft. to 2 ft. No. of sacks used .34
Bentonite from 2 ft. to 7 ft. No. of sacks used 2.6
Method used _____
Cemented by ANTONIO LANDEROS
Distance to septic system field lines _____ ft.
Method of verification of above distance _____

13) TYPE PUMP: N/A

☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____

Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: N/A

Type test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated

Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:

Did you knowingly penetrate any strata which contained undesirable constituents?

☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"

Type of water? _____ Depth of strata _____

Was a chemical analysis made? ☐ Yes ☐ No

10) SURFACE COMPLETION

☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☒ Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL: N/A

Static level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____

12) PACKERS: N/A Type _____ Depth _____

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC.
(Type or print)

WELL DRILLER'S LICENSE NO. 54413M

ADDRESS 8834 CIRCLE DRIVE
(Street or RFD)

AUSTIN TX 78736
(City) (State) (Zip)

(Signed) ANTONIO LANDEROS
(Licensed Well Driller)

(Signed) _____
(Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

Texas Water Well Drillers Advisory Council
P.O. Box 12157
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TNRCC COPY

| ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side | | State of Texas WELL REPORT | | Texas Water Well Drillers Advisory Council P.O. Box 12157 Austin, Tx. 78711 1 800 803 9202 EXT. 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------|--|-----|--|------------|------------|-------------|--|--|---------------|---------------------|---------------------|----|------|-----|--|-----|-----|--|------|-----|------------|-----|----|--|------|-----|------------|-----|----|--|-----|-----|------------------|-----|----|--|
| 1) OWNER <u>USAF/LMTAS</u> ADDRESS <u>P.O. BOX 748</u> FORT WORTH TX 76101 | | (NAME) | | (Street or RFD) (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2) ADDRESS OF WELL: County <u>TARRANT</u> AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX 76108 STATE GRID # <u>32-13-8</u> | | (Street or RFD) | | (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3) TYPE OF WORK (Check): <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Deepening <input type="checkbox"/> Reconditioning <input type="checkbox"/> Plugging | | 4) PROPOSED USE (Check): <input checked="" type="checkbox"/> Monitor <input type="checkbox"/> Environmental Soil Boring <input type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Irrigation <input type="checkbox"/> Injection <input type="checkbox"/> Public Supply <input type="checkbox"/> De-watering <input type="checkbox"/> Testwell If Public Supply well, were plans submitted to the TNRC ? <input type="checkbox"/> Yes <input type="checkbox"/> No | | 5) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6) WELL LOG: <u>TMP 2</u> Date Drilling _____ Started: <u>5/01</u> 19 <u>2000</u> Completed: <u>5/01</u> 19 <u>2000</u> | | DIAMETER OF HOLE <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>Dia. (in.)</th> <th>From (ft.)</th> <th>To (ft.)</th> </tr> <tr> <td>8</td> <td>0</td> <td>32</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table> | | Dia. (in.) | From (ft.) | To (ft.) | 8 | 0 | 32 | | | | | | | 7) DRILLING METHOD (Check): <input type="checkbox"/> Driven <input type="checkbox"/> Air Rotary <input type="checkbox"/> Mud Rotary <input type="checkbox"/> Bored <input type="checkbox"/> Air Hammer <input type="checkbox"/> Cable Tool <input type="checkbox"/> Jetted <input checked="" type="checkbox"/> Other <u>HOLLOW STEM AUGER</u> | | | | | | | | | | | | | | | | | | | | | |
| Dia. (in.) | From (ft.) | To (ft.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 0 | 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From(ft.) To(ft.) Description and color of formation material | | 8) Borehole Completion (Check): <input type="checkbox"/> Open Hole <input type="checkbox"/> Straight Wall <input type="checkbox"/> Underreamed <input type="checkbox"/> Gravel Packed <input checked="" type="checkbox"/> Other <u>See below</u> If gravel packed give interval ... from _____ ft. to _____ ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 .3 CONCRETE | | CASING, BLANK PIPE, AND WELL SCREEN DATA: <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th rowspan="2">Dia. (in.)</th> <th rowspan="2">New or Used</th> <th rowspan="2">Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial</th> <th colspan="2">Setting (ft.)</th> <th rowspan="2">Gage Casting Screen</th> </tr> <tr> <th>From</th> <th>To</th> </tr> <tr> <td>0.25</td> <td>NEW</td> <td>TFE TUBING</td> <td>0.0</td> <td>6.0</td> <td> </td> </tr> <tr> <td>0.25</td> <td>NEW</td> <td>TFE TUBING</td> <td>0.0</td> <td>15</td> <td> </td> </tr> <tr> <td>0.25</td> <td>NEW</td> <td>TFE TUBING</td> <td>0.0</td> <td>25</td> <td> </td> </tr> <tr> <td>1.0</td> <td>NEW</td> <td>SCH 40 CPVC PIPE</td> <td>0.0</td> <td>32</td> <td> </td> </tr> </table> | | | | Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen | From | To | 0.25 | NEW | TFE TUBING | 0.0 | 6.0 | | 0.25 | NEW | TFE TUBING | 0.0 | 15 | | 0.25 | NEW | TFE TUBING | 0.0 | 25 | | 1.0 | NEW | SCH 40 CPVC PIPE | 0.0 | 32 | |
| Dia. (in.) | New or Used | | | | | | | | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | From | To | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25 | NEW | | | | | TFE TUBING | 0.0 | 6.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25 | NEW | | | | | TFE TUBING | 0.0 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25 | NEW | TFE TUBING | 0.0 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.0 | NEW | SCH 40 CPVC PIPE | 0.0 | 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .3 5 SILTY GRAVEL, LT. GRAY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 11 CLAYEY SILT, REDDISH YELLOW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 20 SILTY GRAVEL, PINK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 32 SILTY CLAY, REDDISH YELLOW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13) TYPE PUMP: <u>N/A</u> <input type="checkbox"/> Turbine <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Cylinder <input type="checkbox"/> Other _____ Depth to pump bowls, cylinder, jet, etc., _____ ft. | | 9) CEMENTING DATA [RULE 338.44(1)] Cemented from <u>0</u> ft. to <u>3</u> ft. & <u>6</u> ft. to <u>13</u> ft. Bentonite from <u>3</u> ft. to <u>4</u> ft. & <u>13</u> ft. to <u>14</u> ft. Bentonite from <u>16</u> ft. to <u>24</u> ft. & <u>26</u> ft. to <u>32</u> ft. Sand from <u>4</u> ft. to <u>6</u> ft. & <u>14</u> ft. to <u>16</u> ft. Sand from <u>24</u> ft. to <u>26</u> ft. & _____ ft. to _____ ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14) WELL TESTS: <u>N/A</u> Type test: <input type="checkbox"/> Pump <input type="checkbox"/> Bailer <input type="checkbox"/> Jetted <input type="checkbox"/> Estimated Yield: _____ gpm with _____ ft. drawdown after _____ hrs. | | 10) SURFACE COMPLETION <input type="checkbox"/> Specified Surface Slab Installed [Rule 338.44(2)(A)] <input type="checkbox"/> Specified Steel Sleeve Installed [Rule 338.44(3)(A)] <input type="checkbox"/> Pitless Adapter Used [Rule 338.44(3)(b)] <input checked="" type="checkbox"/> Approved Alternative Procedure Used [Rule 338.71] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable constituents? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, submit "REPORT OF UNDESIRABLE WATER" Type of water? _____ Depth of strata _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input type="checkbox"/> No | | 11) WATER LEVEL: <u>N/A</u> Static level _____ ft. below land surface Date _____ Artesian flow _____ gpm. Date _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal. | | 12) PACKERS: <u>N/A</u> Type _____ Depth _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| COMPANY NAME <u>GEOPROJECTS INTERNATIONAL INC.</u> WELL DRILLER'S LICENSE NO. <u>54413M</u> | | (Type or print) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ADDRESS <u>8834 CIRCLE DRIVE</u> AUSTIN TX 78736 | | (Street or RFD) (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Signed) <u>ANTONIO LANDEROS</u> (Licensed Well Driller) | | (Signed) _____ (Registered Driller Trainee) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Please attach electric log, chemical analysis, and other pertinent information, if available.

Texas Water Well Drillers Advisory Council

P.O. Box 12157

Austin, Tx. 78711

1 800 803 9202 EXT. 9

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse SideState of Texas
WELL REPORT1) OWNER USAF/LMTAS ADDRESS P.O. BOX 748 FORT WORTH TX 76101
(NAME) (Street or RFD) (City) (State) (Zip)2) ADDRESS OF WELL:
County TARRANT AIR FORCE PLANT 4, BLDG 181 FORT WORTH TX 76108 STATE GRID # 32-13-8
(Street or RFD) (City) (State) (Zip)

3) TYPE OF WORK (Check):

☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):

☒ Monitor ☐ Environmental Soil Boring ☐ Domestic
☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRC ? ☐ Yes ☐ No

5)

6) WELL LOG: TMP 3

Date Drilling

Started: 5/01 19 2000Completed: 5/01 19 2000

DIAMETER OF HOLE

Dia. (in.) From (ft.) To (ft.)

8 0 32

7) DRILLING METHOD (Check):

☐ Driven
☐ Air Rotary ☐ Mud Rotary ☐ Bored
☐ Air Hammer ☐ Cable Tool ☐ Jetted
☒ Other HOLLOW STEM AUGER

From(ft.) To(ft.) Description and color of formation material

| | | |
|----|----|-------------------------------|
| 0 | .3 | CONCRETE |
| .3 | 4 | SILTY GRAVEL, V. PALE BROWN |
| 4 | 18 | CLAYEY SILT, REDDISH YELLOW |
| 18 | 20 | GRAVELLY SAND, REDDISH YELLOW |
| 20 | 26 | CLAYEY SILT, YELLOWISH RED |
| 26 | 32 | SILTY CLAY, YELLOWISH RED |

8) Borehole Completion (Check):

☐ Open Hole ☐ Straight Wall☐ Underreamed ☐ Gravel Packed ☒ Other See below

If gravel packed give interval ... from _____ ft. to _____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen |
|---------------|-------------------|--|---------------|-----|---------------------------|
| | | | From | To | |
| 0.25 | NEW | TFE TUBING | 0.0 | 6.0 | |
| 0.25 | NEW | TFE TUBING | 0.0 | 15 | |
| 0.25 | NEW | TFE TUBING | 0.0 | 25 | |
| 1.0 | NEW | SCH 40 CPVC PIPE | 0.0 | 32 | |

9) CEMENTING DATA [RULE 338.44(1)]

Cemented from 0 ft. to 3 ft. & 6 ft. to 13 ft.
 Bentonite from 3 ft. to 4 ft. & 13 ft. to 14 ft.
 Bentonite from 16 ft. to 24 ft. & 26 ft. to 32 ft.
 Sand from 4 ft. to 6 ft. & 14 ft. to 16 ft.
 Sand from 24 ft. to 26 ft. & _____ ft. to _____ ft.

13) TYPE PUMP: N/A☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____

Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: N/AType test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated

Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:

Did you knowingly penetrate any strata which contained undesirable constituents?

☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"

Type of water? _____ Depth of strata _____

Was a chemical analysis made? ☐ Yes ☐ No

10) SURFACE COMPLETION

☐ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☒ Approved Alternative Procedure Used [Rule 338.71]11) WATER LEVEL: N/A

Static level _____ ft. below land surface Date _____

Artesian flow _____ gpm. Date _____

12) PACKERS: N/A Type _____ Depth _____

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC.
(Type or print)WELL DRILLER'S LICENSE NO. 54413MADDRESS 8834 CIRCLE DRIVE
(Street or RFD)AUSTIN TX 78736
(City) (State) (Zip)(Signed) ANTONIO LANDEROS
(Licensed Well Driller)(Signed) _____
(Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse Side

State of Texas
WELL REPORT

| 1) OWNER <u>USAF/LMTAS</u> (NAME) | | ADDRESS <u>P.O. BOX 748</u> (Street or RFD) | | FORT WORTH TX 76101 (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------|--|-----|--|--|------------|-------------|--|--|---------------|---------------------|---------------------|----|------|-----|------------|-----|-----|--|------|-----|------------|-----|----|--|------|-----|------------|-----|----|--|-----|-----|------------------|-----|----|--|
| 2) ADDRESS OF WELL: County <u>TARRANT</u> | | <u>AIR FORCE PLANT 4, BLDG 181</u> (Street or RFD) | | FORT WORTH TX 76108 STATE GRID # <u>32-13-8</u> (City) (State) (Zip) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3) TYPE OF WORK (Check): <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Deepening <input type="checkbox"/> Reconditioning <input type="checkbox"/> Plugging | | 4) PROPOSED USE (Check): <input checked="" type="checkbox"/> Monitor <input type="checkbox"/> Environmental Soil Boring <input type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Irrigation <input type="checkbox"/> Injection <input type="checkbox"/> Public Supply <input type="checkbox"/> De-watering <input type="checkbox"/> Testwell If Public Supply well, were plans submitted to the TNRCC ? <input type="checkbox"/> Yes <input type="checkbox"/> No | | 5) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6) WELL LOG: <u>TMP 4</u> Date Drilling _____ Started: <u>5/02</u> 19 <u>2000</u> Completed: <u>5/02</u> 19 <u>2000</u> | | DIAMETER OF HOLE Dia. (in.) From (ft.) To (ft.) <u>8</u> <u>0</u> <u>32</u> | | 7) DRILLING METHOD (Check): <input type="checkbox"/> Driven <input type="checkbox"/> Air Rotary <input type="checkbox"/> Mud Rotary <input type="checkbox"/> Bored <input type="checkbox"/> Air Hammer <input type="checkbox"/> Cable Tool <input type="checkbox"/> Jetted <input checked="" type="checkbox"/> Other <u>HOLLOW STEM AUGER</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From(ft.) To(ft.) Description and color of formation material | | 8) Borehole Completion (Check): <input type="checkbox"/> Open Hole <input type="checkbox"/> Straight Wall <input type="checkbox"/> Underreamed <input type="checkbox"/> Gravel Packed <input checked="" type="checkbox"/> Other <u>See below</u> If gravel packed give interval ... from _____ ft. to _____ ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 .3 CONCRETE | | CASING, BLANK PIPE, AND WELL SCREEN DATA: <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th rowspan="2">Dia. (in.)</th> <th rowspan="2">New or Used</th> <th rowspan="2">Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial</th> <th colspan="2">Setting (ft.)</th> <th rowspan="2">Gage Casting Screen</th> </tr> <tr> <th>From</th> <th>To</th> </tr> <tr> <td>0.25</td> <td>NEW</td> <td>TFE TUBING</td> <td>0.0</td> <td>6.0</td> <td></td> </tr> <tr> <td>0.25</td> <td>NEW</td> <td>TFE TUBING</td> <td>0.0</td> <td>15</td> <td></td> </tr> <tr> <td>0.25</td> <td>NEW</td> <td>TFE TUBING</td> <td>0.0</td> <td>25</td> <td></td> </tr> <tr> <td>1.0</td> <td>NEW</td> <td>SCH 40 CPVC PIPE</td> <td>0.0</td> <td>32</td> <td></td> </tr> </table> | | | | Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen | From | To | 0.25 | NEW | TFE TUBING | 0.0 | 6.0 | | 0.25 | NEW | TFE TUBING | 0.0 | 15 | | 0.25 | NEW | TFE TUBING | 0.0 | 25 | | 1.0 | NEW | SCH 40 CPVC PIPE | 0.0 | 32 | |
| Dia. (in.) | New or Used | | | | | | | | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial | Setting (ft.) | | Gage Casting Screen | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | From | To | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25 | NEW | | | | | TFE TUBING | 0.0 | 6.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25 | NEW | | | | | TFE TUBING | 0.0 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25 | NEW | TFE TUBING | 0.0 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.0 | NEW | SCH 40 CPVC PIPE | 0.0 | 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .3 4 SILTY GRAVEL, V. PALE BROWN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 18 CLAYEY SILT, REDDISH YELLOW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 30 CLAYEY SILT, STRONG BROWN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 31.5 SILTY GRAVEL, REDDISH YELLOW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31.5 32 SILTY CLAY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 9) CEMENTING DATA [RULE 338.44(1)] Cemented from <u>0</u> ft. to <u>3</u> ft. & <u>6</u> ft. to <u>13</u> ft. Bentonite from <u>3</u> ft. to <u>4</u> ft. & <u>13</u> ft. to <u>14</u> ft. Bentonite from <u>16</u> ft. to <u>24</u> ft. & <u>26</u> ft. to <u>32</u> ft. Sand from <u>4</u> ft. to <u>6</u> ft. & <u>14</u> ft. to <u>16</u> ft. Sand from <u>24</u> ft. to <u>26</u> ft. & _____ ft. to _____ ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13) TYPE PUMP: <u>N/A</u> <input type="checkbox"/> Turbine <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Cylinder <input type="checkbox"/> Other _____ Depth to pump bowls, cylinder, jet, etc., _____ ft. | | 10) SURFACE COMPLETION <input type="checkbox"/> Specified Surface Slab Installed [Rule 338.44(2)(A)] <input type="checkbox"/> Specified Steel Sleeve Installed [Rule 338.44(3)(A)] <input type="checkbox"/> Pitless Adapter Used [Rule 338.44(3)(b)] <input checked="" type="checkbox"/> Approved Alternative Procedure Used [Rule 338.71] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14) WELL TESTS: <u>N/A</u> Type test: <input type="checkbox"/> Pump <input type="checkbox"/> Bailer <input type="checkbox"/> Jetted <input type="checkbox"/> Estimated Yield: _____ gpm with _____ ft. drawdown after _____ hrs. | | 11) WATER LEVEL: <u>N/A</u> Static level _____ ft. below land surface Date _____ Artesian flow _____ gpm. Date _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable constituents? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, submit "REPORT OF UNDESIRABLE WATER" Type of water? _____ Depth of strata _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input type="checkbox"/> No | | 12) PACKERS: <u>N/A</u> Type _____ Depth _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC. WELL DRILLER'S LICENSE NO. 54413M
(Type or print)

ADDRESS 8834 CIRCLE DRIVE AUSTIN TX 78736
(Street or RFD) (City) (State) (Zip)

(Signed) ANTONIO LANDEROS (Signed) _____
(Licensed Well Driller) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

Appendix C
Corrosion Potential Memo



11 April 2000

Mr. Craig Holloway
Radian International LLC
8501 N. MoPac Blvd
Austin, TX 78759

**Subject: Assessment of Risk of Significant Corrosion of Buried Infrastructure by
 Impressed AC Field During Waste Remediation**

Dear Craig,

OBJECTIVE

M&M Engineering understands that Radian International plans to install CES SPA electrode array under a building for soil-heating purposes to recover a volatile contaminant. AC voltages of approximately 300 V rms will be passed between the electrodes of the array to heat the soil, allowing removal of a contaminant.

An existing cast iron waterworks pipe runs through the proposed electrode array. This pipe has been in service for more than 50 years. Radian International has asked M&M Engineering to consider the potential corrosive damage to the pipe resulting from operation of the electrode array.

CONCLUSION

It is unlikely that operation of the CES SPA array for nine weeks will produce a measurable amount of metal loss from buried infrastructure impinged by the AC field.

DISCUSSION

Current Condition of Pipe and Relevance to Risk Assessment

Cast iron consists of a network of graphite (carbon) flakes in an iron matrix. When cast iron corrodes, the iron dissolves but the graphite is not affected. Eventually all that is left is the graphite network, which retains the original shape of the cast iron object. Fully graphitized cast iron pipe would appear unaltered to the eye, but would be very light and fairly fragile.

The current condition of the pipe is unknown to M&M Engineering, but there are three possibilities, given that the line remains functional after 50 years.

- If the soil is essentially non-corrosive, the pipe may have suffered little graphitization.
- If the soil is slightly to moderately corrosive, the outer surface of the pipe may be entirely graphitized while the iron matrix remains intact in the interior of the wall.

**MECHANICAL & MATERIALS
ENGINEERING**

8501 N. MOPAC BLVD. SUITE 100 • AUSTIN, TX. 78759 512-407-8598 • FAX 512-407-3766





Mr. Craig Holloway
11 April 2000
Page 2

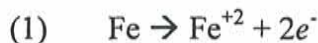
- If the soil is still more corrosive, the pipe will have been entirely graphitized. Fully graphitized cast iron sanitary pipe can continue to function for years if the surrounding soil is tightly packed and does not move.

The condition of the pipe is relevant to the risk assessment in two ways. First, stray current due to the impressed AC field from the CES SPA array will have no effect if the pipe has already been graphitized. Secondly, depending on its current conditions, the pipe could fail during or after the remediation treatment for reasons unrelated to the impressed AC field used to heat the soil.

Potential For Damage

Figure 1 shows how an impressed potential field in the soil can cause corrosion of buried pipe. In this figure the field is negative toward the left edge of the figure and positive towards the right. The metal bonding electrons in the pipe wall spontaneously migrate toward the positive pole of the field, with the result that a potential difference is impressed on the length of the pipe. Electrons are withdrawn from the anodic (positive) end of the pipe and concentrated at the cathodic (negative) end of the pipe.

If the pipe is not graphitized, iron will be consumed according to the reaction



If the pipe is graphitized, reaction 1 will not occur. Instead, the potential will cause local decomposition of water in the soil, a reaction that does not remove mass from the pipe.

The electrons released into the cast iron at the anodic (positive) site are consumed by any of several reduction (electron accepting) reactions at the cathodic (negative) end of the pipe. The entire process is referred to as "stray current."

Stray currents due to impressed DC potentials can be extremely damaging, consuming 20 pounds of iron per amp-year of current. Impressed AC currents, on the other hand, cause comparatively little metal wastage, typically consuming less than one pound of iron per amp-year of stray current passed¹. Stray AC currents have not been shown to contribute to any significant corrosion of ferrous structures².

Modeled Results

The potential metal wastage from the buried iron pipe was modeled using the following assumptions.

¹ *Cathodic Protection Theory and Data Interpretation*, Chapter 8, NACE International, Houston, TX, 1989.

² Revie, R. Winston, ed., "Chapter 58: Stray Current Analysis," *Uhlig's Corrosion Handbook*, second edition, John Wiley and Sons, Inc, 2000.



Mr. Craig Holloway
11 April 2000
Page 3

- The soil is non-corrosive, and thus has a resistivity greater than 20,000 ohm-cm. If the soil is corrosive (has a low resistivity) the pipe is already graphitized and the AC current will have no effect.
- All of the metal loss will occur in a 2-inch wide band at each end of the pipe. Given this reasonable worst case assumption, the localized wastage rate for a nominal 3-inch cast iron line (which is actually 3.5 inches O.D.) would be not more than 86 mils/amp-yr.

Figure 2 shows the modeled estimates of the metal loss due to impressed AC from the CES SPA array at an impressed potential of 300 V rms between adjacent electrodes, assuming that the soil is non-corrosive. The greatest potential for metal loss occurs in the transition zone between the array and the surrounding soil. Even in this zone, the estimated wall loss due to the impressed AC current is less than 1 mil (1 mil = 0.001 inch), an insignificant loss.

The rate of metal loss, assuming that the pipe is not graphitized, is directly proportional to the electrode-to-electrode potential. Raising the potential from 300 V_{rms} to 600 V_{rms} would double the rate of attack.

The rate of attack is inversely proportional to the diameter of the pipe. The results in Figure 3 are for 3-inch pipe. Wastage rates for different diameters would follow the equation

$$\text{eq 3} \quad \text{Loss for diameter } D_2 = \text{Loss for 3-inch pipe} \frac{3.5 \text{ inch}}{D_2 (\text{actual O.D.})}$$

The loss would be less on larger diameter pipe would be less.

Kind regards,

Peter F. Ellis II
Principal Scientist
Corrosion and Materials Selection

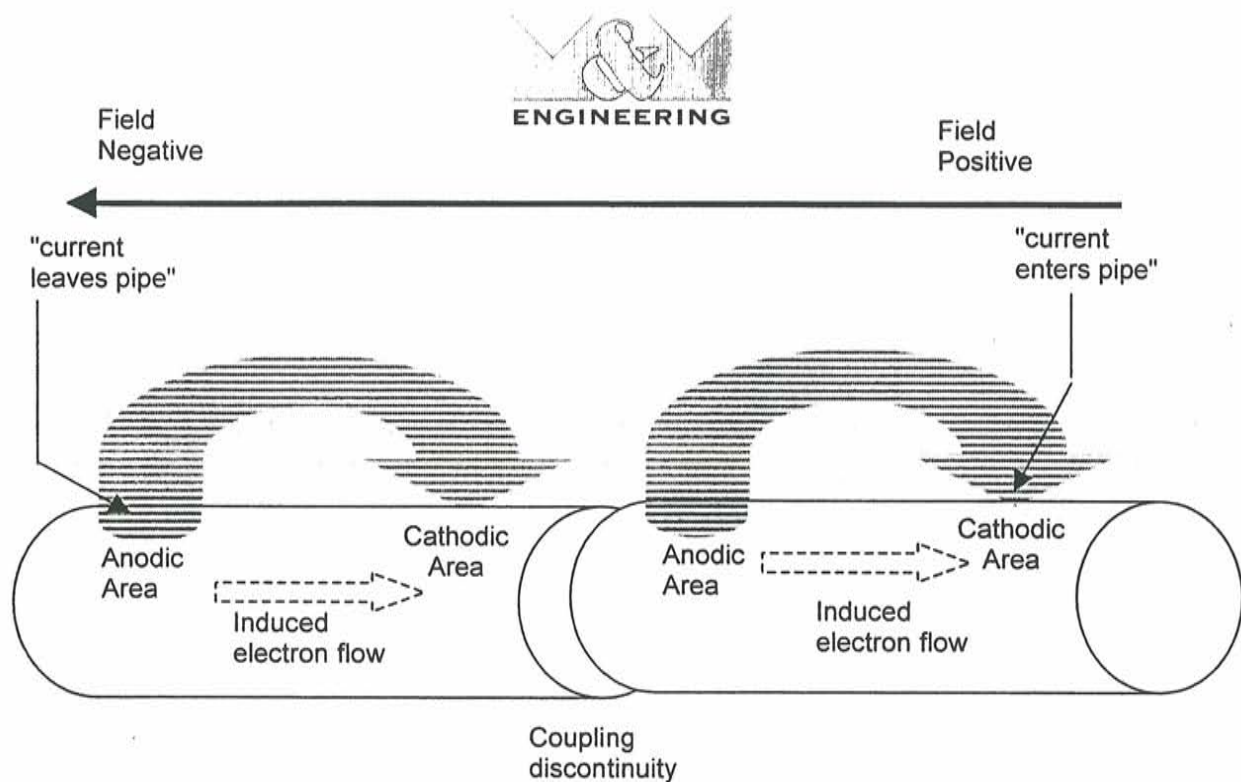


Figure 1. Effect of Impressed Potential on buried pipe

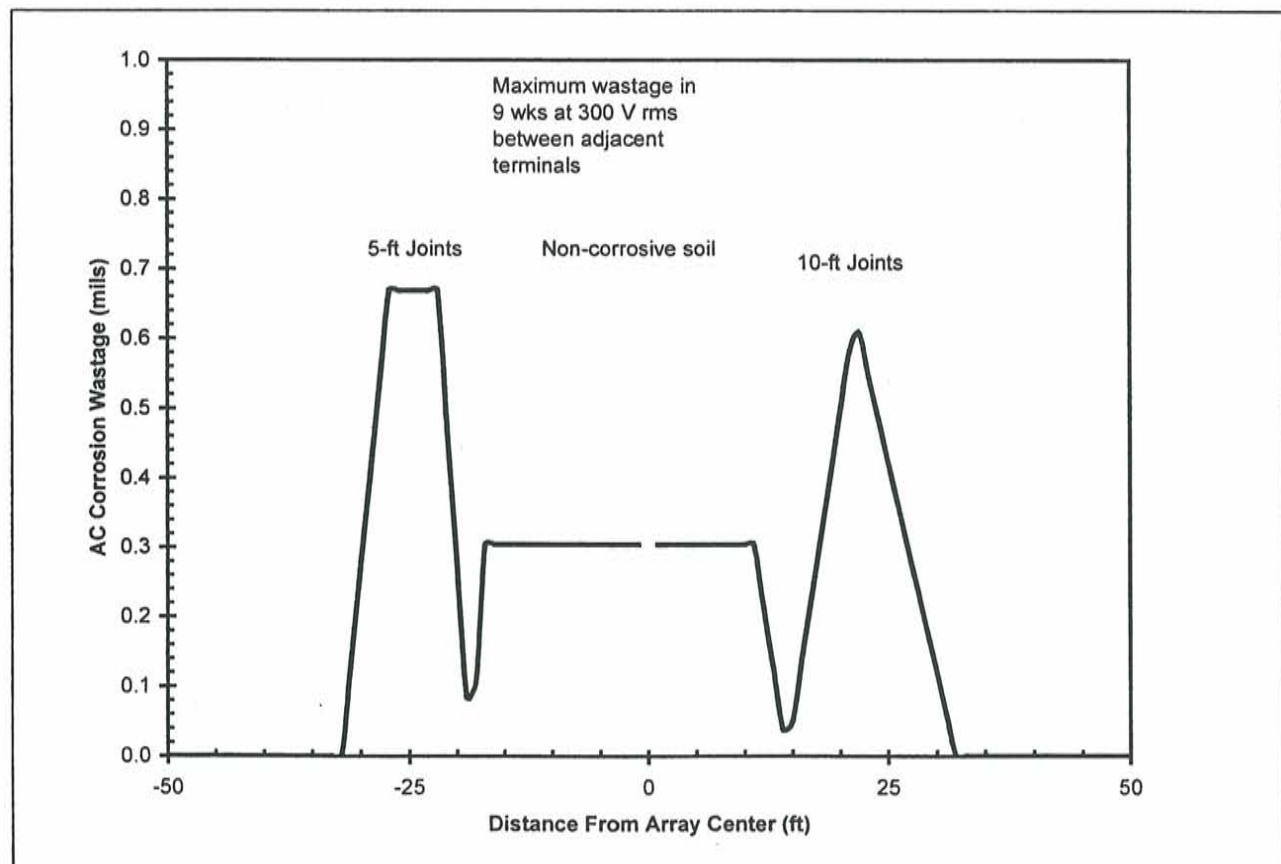


Figure 2. Estimated AC-induced wastage of "3-inch" cast iron sanitary pipe during nine weeks of soil treatment.



PETER F. ELLIS II

PRINCIPAL SCIENTIST

OVERVIEW

Mr. Ellis brings the perspectives of physical chemistry and electrochemistry to M&M Engineering's corrosion investigations, assuring a firm theoretical foundation for all work performed. Mr. Ellis

- Directs M&M Engineering's Electrochemistry and Corrosion Laboratory, applying state-of-the-art electrochemical test methods to the solution of aqueous corrosion problems at temperature below the critical point of water.
- Has directed more than 400 machinery failure analyses and corrosion investigations of common engineering and exotic alloys, natural and synthetic rubbers, filled organic resin coatings, and fiber-reinforced composites.
- Is internationally recognized as a leading authority in the field of utility flue gas desulfurization (FGD) materials selection, corrosion engineering, and failure analysis.
- Has published more than 1000 pages on the subject of materials selection and design of geothermal power plants
- Conducted the first-ever corrosion studies in support of the first utility compressed air energy storage (CAES) system in the United States.

YEARS OF EXPERIENCE: 24

EDUCATION AND LICENSES:

BS, 1977, Chemistry (ACS-accredited),
Southwest Texas State University
San Marcos, TX

NACE Course on Cathodic Protection--Theory
and Data Interpretation

NACE Course on Internal Corrosion Control in
Pipelines

LITIGATION SUPPORT EXPERIENCE: Yes

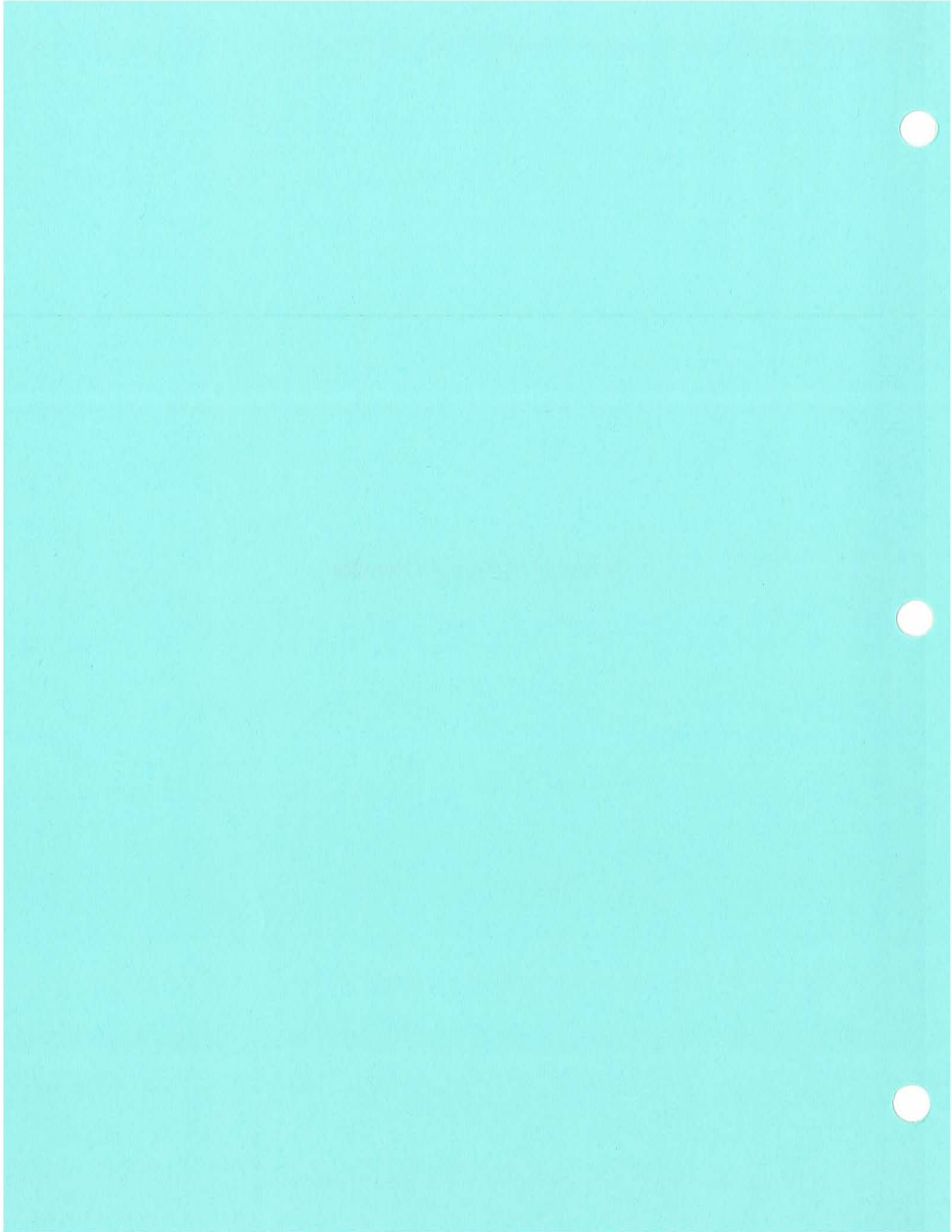
AREAS OF SPECIALIZATION:

- Electrochemical corrosion theory, analysis, and design of laboratory simulations of process conditions for corrosion testing.
- Diagnosis/remediation of corrosion-related problems.
- Materials selection for novel (first of a kind) systems.
- Degradation of non-metallic materials
- Material Selection and Corrosion for Flue Gas Desulfurization (FGD) Systems
- Materials Selection and Corrosion for Geothermal Energy Utilization Systems

In addition to solving corrosion problems for M&M Engineering's clients, a considerable portion of Mr. Ellis' time is devoted to anticipating corrosion problems in new processes and recommending materials selection and/or design changes to mitigate these problems.

Appendix D
Analytical Data

Vapor (Air) Sample Results



| | SITE ID |
|--|--------------|
| | LOCATION ID |
| | SAMPLE ID |
| | DATE SAMPLED |

Bldg181
HDR_LINE
AFP4-HL0938
25-MAY-2000

PARAMETER

| PARAMETER | | |
|---------------------------------------|---------|-----------------|
| T014 - Volatiles in Air (ELCD) (ppmV) | | |
| 1,1,1-Trichloroethane | 0.00507 | (0.00415) [3] |
| 1,1-Dichloroethene | ND | (0.00231) [3] |
| 1,2-Dibromoethane | ND | (0.00907) [3] |
| 1,2-Dichloroethane | ND | (0.0122) [3] |
| Carbon tetrachloride | 0.0589 | (0.00700) [3] |
| Chloroform | ND | (0.00354) [3] |
| Tetrachloroethene | ND | (0.00705) [3] |
| Trichloroethene | 7.92 | (0.110) [3] |
| Vinyl chloride | ND | (0.00768) [3] |
| cis-1,2-Dichloroethene | 0.0997 | (0.00435) [3] |

| | | |
|--------------------------------------|---------|-----------------|
| T014 - Volatiles in Air (FID) (ppmV) | | |
| Benzene | ND | (0.00168) [3] |
| Styrene | 0.00800 | (0.00449) [3] |
| o-Xylene/1,1,2,2-TCA | ND | (0.00454) [3] |
| p-Xylene/m-Xylene/Bromoform | 0.00733 | (0.00680) [3] |

TABLE 1

RESULTS OF ORGANIC ANALYSES FOR AIR SAMPLES, AFP4 SPH2

Page: 1

| PARAMETER | SITE ID | | | | | | | |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | LOCATION ID | | SAMPLE ID | | DATE SAMPLED | | | |
| | Bldg181 | | Bldg181 | | Bldg181 | | Bldg181 | |
| | HDR_LINE | | HDR_LINE | | HDR_LINE | | HDR_LINE | |
| | AFP4-SPH-SV01-0 | | AFP4-SPH-SV02-0 | | AFP4-SPH-SV03-0 | | AFP4-SPH-SV04-0 | |
| | 09-AUG-2000 | | 11-AUG-2000 | | 15-AUG-2000 | | 18-AUG-2000 | |
| ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| T014 - Volatiles in Air (ELCD) (ppmV) | | | | | | | | |
| 1,1,1-Trichloroethane | 0.0176 | (0.00617) [3] | 0.0182 | (0.00594) [3] | 0.0168 | (0.00576) [3] | 0.0175 | (0.00606) [3] |
| 1,1-Dichloroethene | ND | (0.00492) [3] | ND | (0.00473) [3] | 0.0822 | (0.00459) [3] | ND | (0.00482) [3] |
| 1,2-Dibromoethane | ND | (0.00789) [3] | 0.0134 | (0.00759) [3] | ND | (0.00736) [3] | ND | (0.00774) [3] |
| 1,2-Dichloroethane | ND | (0.0106) [3] | ND | (0.0102) [3] | ND | (0.00988) [3] | ND | (0.0104) [3] |
| Carbon tetrachloride | ND | (0.0165) [3] | ND | (0.0159) [3] | ND | (0.0154) [3] | ND | (0.0162) [3] |
| Chloroform | ND | (0.00511) [3] | ND | (0.00491) [3] | 0.00595 | (0.00476) [3] | 0.00415 | (0.00501) [3] |
| Tetrachloroethene | ND | (0.00819) [3] | ND | (0.00788) [3] | ND | (0.00764) [3] | ND | (0.00804) [3] |
| Trichloroethene | 7.50 | (0.00606) [3] | 6.35 | (0.00583) [3] | 6.49 | (0.113) [3] | 6.04 | (0.119) [3] |
| Vinyl chloride | ND | (0.0269) [3] | ND | (0.0259) [3] | ND | (0.0251) [3] | ND | (0.0264) [3] |
| cis-1,2-Dichloroethene | 0.0143 | (0.0134) [3] | 0.0225 | (0.0129) [3] | 0.00829 | (0.0125) [3] | 0.0106 | (0.0131) [3] |
| T014 - Volatiles in Air (FID) (ppmV) | | | | | | | | |
| Benzene | 0.0113 | (0.00549) [3] | 0.0298 | (0.00528) [3] | ND | (0.00512) [3] | 0.00969 | (0.00538) [3] |
| Styrene | ND | (0.00385) [3] | ND | (0.00370) [3] | ND | (0.00359) [3] | ND | (0.00378) [3] |
| o-Xylene/1,1,2,2-TCA | ND | (0.00556) [3] | ND | (0.00535) [3] | ND | (0.00519) [3] | ND | (0.00546) [3] |
| p-Xylene/m-Xylene/Bromoform | ND | (0.0123) [3] | 0.0106 | (0.0118) [3] | ND | (0.0114) [3] | 0.0103 | (0.0120) [3] |

TABLE 1

RESULTS OF ORGANIC ANALYSES FOR AIR SAMPLES, AFP4 SPH2

Page: 2

| PARAMETER | SITE ID | | | | LOCATION ID | | | | SAMPLE ID | | | | DATE SAMPLED | | | |
|---------------------------------------|-----------------|---|---------|-------|-----------------|---|---------|-------|-----------------|---|---------|-------|-----------------|---|---------|-------|
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | |
| | HDR_LINE | | | | HDR_LINE | | | | HDR_LINE | | | | HDR_LINE | | | |
| | AFP4-SPH-SV05-0 | | | | AFP4-SPH-SV06-0 | | | | AFP4-SPH-SV07-0 | | | | AFP4-SPH-SV08-0 | | | |
| | 22-AUG-2000 | | | | 25-AUG-2000 | | | | 30-AUG-2000 | | | | 01-SEP-2000 | | | |
| TO14 - Volatiles in Air (ELCD) (ppmV) | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 0.0104 | (| 0.00593 |) [3] | 0.0121 | (| 0.00568 |) [3] | 0.0325 | (| 0.00650 |) [4] | 0.0310 | (| 0.00606 |) [3] |
| 1,1-Dichloroethene | 0.0343 | (| 0.00472 |) [3] | 0.341 | (| 0.00452 |) [3] | 0.0390 | (| 0.00517 |) [4] | 0.0103 | (| 0.00483 |) [3] |
| 1,2-Dibromoethane | ND | (| 0.00758 |) [3] | ND | (| 0.00726 |) [3] | ND | (| 0.00830 |) [4] | ND | (| 0.00774 |) [3] |
| 1,2-Dichloroethane | ND | (| 0.0102 |) [3] | ND | (| 0.00975 |) [3] | ND | (| 0.0111 |) [4] | ND | (| 0.0104 |) [3] |
| Carbon tetrachloride | ND | (| 0.0159 |) [3] | ND | (| 0.0152 |) [3] | ND | (| 0.0174 |) [4] | ND | (| 0.0162 |) [3] |
| Chloroform | 0.00992 | (| 0.00490 |) [3] | 0.00963 | (| 0.00470 |) [3] | 0.0305 | (| 0.00537 |) [4] | 0.0245 | (| 0.00501 |) [3] |
| Tetrachloroethene | 0.0397 | (| 0.00787 |) [3] | 0.141 | (| 0.00754 |) [3] | 0.0173 | (| 0.00862 |) [4] | 0.00908 | (| 0.00804 |) [3] |
| Trichloroethene | 17.8 | (| 0.116 |) [3] | 92.2 | (| 0.112 |) [3] | 132 | (| 1.27 |) [4] | 65.9 | (| 1.19 |) [3] |
| Vinyl chloride | ND | (| 0.0259 |) [3] | ND | (| 0.0248 |) [3] | ND | (| 0.0283 |) [4] | ND | (| 0.0265 |) [3] |
| cis-1,2-Dichloroethene | 0.0104 | (| 0.0128 |) [3] | 0.00580 | (| 0.0123 |) [3] | 0.0460 | (| 0.0141 |) [4] | 0.0488 | (| 0.0131 |) [3] |
| TO14 - Volatiles in Air (FID) (ppmV) | | | | | | | | | | | | | | | | |
| Benzene | 0.155 | (| 0.00527 |) [3] | 0.0303 | (| 0.00505 |) [3] | 0.0343 | (| 0.00577 |) [4] | 0.0319 | (| 0.00539 |) [3] |
| Styrene | 0.0139 | (| 0.00370 |) [3] | ND | (| 0.00354 |) [3] | ND | (| 0.00405 |) [4] | ND | (| 0.00378 |) [3] |
| o-Xylene/1,1,2,2-TCA | 0.0133 | (| 0.00534 |) [3] | ND | (| 0.00512 |) [3] | ND | (| 0.00585 |) [4] | ND | (| 0.00546 |) [3] |
| p-Xylene/m-Xylene/Bromoform | 0.0254 | (| 0.0118 |) [3] | 0.0137 | (| 0.0113 |) [3] | 0.00990 | (| 0.0129 |) [4] | 0.00939 | (| 0.0120 |) [3] |

TABLE 1

RESULTS OF ORGANIC ANALYSES FOR AIR SAMPLES, AFP4 SPH2

Page: 3

| PARAMETER | SITE ID | | | | LOCATION ID | | | | SAMPLE ID | | | | DATE SAMPLED | | | |
|---------------------------------------|-----------------|---|---------|-------|-----------------|---|---------|-------|-----------------|---|---------|-------|-----------------|---|---------|-------|
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | |
| | HDR_LINE | | | | HDR_LINE | | | | HDR_LINE | | | | HDR_LINE | | | |
| | AFP4-SPH-SV09-0 | | | | AFP4-SPH-SV10-0 | | | | AFP4-SPH-SV11-0 | | | | AFP4-SPH-SV12-0 | | | |
| | 05-SEP-2000 | | | | 08-SEP-2000 | | | | 12-SEP-2000 | | | | 15-SEP-2000 | | | |
| T014 - Volatiles in Air (ELCD) (ppmV) | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 0.0254 | (| 0.00897 |) [5] | 0.0233 | (| 0.00620 |) [3] | 0.0274 | (| 0.00644 |) [4] | 0.0156 | (| 0.00603 |) [3] |
| 1,1-Dichloroethene | 0.0778 | (| 0.00714 |) [5] | 0.0208 | (| 0.00494 |) [3] | 0.168 | (| 0.00513 |) [4] | 0.0935 | (| 0.00480 |) [3] |
| 1,2-Dibromoethane | ND | (| 0.0115 |) [5] | ND | (| 0.00792 |) [3] | ND | (| 0.00823 |) [4] | ND | (| 0.00770 |) [3] |
| 1,2-Dichloroethane | ND | (| 0.0154 |) [5] | ND | (| 0.0106 |) [3] | ND | (| 0.0111 |) [4] | ND | (| 0.0103 |) [3] |
| Carbon tetrachloride | ND | (| 0.0240 |) [5] | ND | (| 0.0166 |) [3] | ND | (| 0.0173 |) [4] | ND | (| 0.0161 |) [3] |
| Chloroform | 0.0202 | (| 0.00742 |) [5] | 0.0195 | (| 0.00513 |) [3] | 0.0226 | (| 0.00533 |) [4] | 0.0133 | (| 0.00498 |) [3] |
| Tetrachloroethene | 0.0153 | (| 0.0119 |) [5] | 0.0190 | (| 0.00823 |) [3] | 0.0457 | (| 0.00855 |) [4] | 0.0260 | (| 0.00800 |) [3] |
| Trichloroethene | 123 | (| 1.76 |) [5] | 126 | (| 1.22 |) [3] | 345 | (| 1.26 |) [4] | 195 | (| 1.18 |) [3] |
| Vinyl chloride | ND | (| 0.0392 |) [5] | ND | (| 0.0271 |) [3] | ND | (| 0.0281 |) [4] | ND | (| 0.0263 |) [3] |
| cis-1,2-Dichloroethene | 0.0740 | (| 0.0194 |) [5] | 0.0389 | (| 0.0134 |) [3] | 0.0536 | (| 0.0140 |) [4] | 0.0363 | (| 0.0131 |) [3] |
| T014 - Volatiles in Air (FID) (ppmV) | | | | | | | | | | | | | | | | |
| Benzene | ND | (| 0.00797 |) [5] | ND | (| 0.00551 |) [3] | 0.114 | (| 0.00572 |) [4] | ND | (| 0.00536 |) [3] |
| Styrene | ND | (| 0.00559 |) [5] | ND | (| 0.00387 |) [3] | ND | (| 0.00401 |) [4] | ND | (| 0.00376 |) [3] |
| o-Xylene/1,1,2,2-TCA | ND | (| 0.00809 |) [5] | ND | (| 0.00559 |) [3] | 0.0132 | (| 0.00580 |) [4] | ND | (| 0.00543 |) [3] |
| p-Xylene/m-Xylene/Bromoform | ND | (| 0.0178 |) [5] | ND | (| 0.0123 |) [3] | 0.0331 | (| 0.0128 |) [4] | 0.0204 | (| 0.0120 |) [3] |

TABLE 1

RESULTS OF ORGANIC ANALYSES FOR AIR SAMPLES, AFP4 SPH2

Page: 4

| PARAMETER | SITE ID | | | | | | | |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | LOCATION ID | | SAMPLE ID | | DATE SAMPLED | | | |
| | Bldg181 | | Bldg181 | | Bldg181 | | Bldg181 | |
| | HDR_LINE | | HDR_LINE | | HDR_LINE | | HDR_LINE | |
| | AFP4-SPH-SV13-0 | | AFP4-SPH-SV14-0 | | AFP4-SPH-SV15-0 | | AFP4-SPH-SV16-0 | |
| | 19-SEP-2000 | | 21-SEP-2000 | | 25-SEP-2000 | | 28-SEP-2000 | |
| T014 - Volatiles in Air (ELCD) (ppmV) | | | | | | | | |
| 1,1,1-Trichloroethane | 0.0269 | (0.00599) [3] | 0.0207 | (0.00596) [3] | 0.0199 | (0.00604) [3] | 0.0191 | (0.00573) [3] |
| 1,1-Dichloroethene | 0.226 | (0.00477) [3] | 0.143 | (0.00475) [3] | 0.650 | (0.00481) [3] | 0.457 | (0.00457) [3] |
| 1,2-Dibromoethane | ND | (0.00766) [3] | ND | (0.00762) [3] | ND | (0.00772) [3] | ND | (0.00733) [3] |
| 1,2-Dichloroethane | ND | (0.0103) [3] | ND | (0.0102) [3] | ND | (0.0104) [3] | ND | (0.00984) [3] |
| Carbon tetrachloride | ND | (0.0161) [3] | ND | (0.0160) [3] | ND | (0.0162) [3] | ND | (0.0154) [3] |
| Chloroform | 0.0148 | (0.00496) [3] | 0.00969 | (0.00493) [3] | 0.0113 | (0.00500) [3] | 0.00737 | (0.00474) [3] |
| Tetrachloroethene | 0.0471 | (0.00795) [3] | 0.0291 | (0.00791) [3] | 0.0124 | (0.00802) [3] | 0.00868 | (0.00761) [3] |
| Trichloroethene | 341 | (1.18) [3] | 216 | (1.17) [3] | 97.2 | (1.19) [3] | 65.1 | (1.13) [3] |
| Vinyl chloride | ND | (0.0262) [3] | ND | (0.0260) [3] | ND | (0.0264) [3] | ND | (0.0250) [3] |
| cis-1,2-Dichloroethene | 0.0573 | (0.0130) [3] | 0.0426 | (0.0129) [3] | 0.0539 | (0.0131) [3] | 0.0475 | (0.0124) [3] |
| T014 - Volatiles in Air (FID) (ppmV) | | | | | | | | |
| Benzene | 0.00991 | (0.00533) [3] | 0.0167 | (0.00530) [3] | ND | (0.00537) [3] | ND | (0.00510) [3] |
| Styrene | ND | (0.00374) [3] | 0.0216 | (0.00372) [3] | ND | (0.00377) [3] | ND | (0.00358) [3] |
| o-Xylene/1,1,2,2-TCA | ND | (0.00540) [3] | ND | (0.00537) [3] | ND | (0.00544) [3] | ND | (0.00517) [3] |
| p-Xylene/m-Xylene/Bromoform | 0.0144 | (0.0119) [3] | 0.0117 | (0.0118) [3] | ND | (0.0120) [3] | ND | (0.0114) [3] |

| PARAMETER | SITE ID | | | |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|
| | LOCATION ID | | | |
| PARAMETER | SAMPLE ID | | | |
| | DATE SAMPLED | | | |
| | Bldg181 | | Bldg181 | |
| | HDR_LINE | | HDR_LINE | |
| | AFP4-SPH-SV17-0 | | AFP4-SPH-SV18-0 | |
| | 05-OCT-2000 | | 19-OCT-2000 | |
| ----- | ----- | | ----- | |
| T014 - Volatiles in Air (ELCD) (ppmV) | | | | |
| 1,1,1-Trichloroethane | 0.0150 | (0.00559) [3] | 0.0143 | (0.00576) [3] |
| 1,1-Dichloroethene | 0.00642 | (0.00445) [3] | 0.0177 | (0.00459) [3] |
| 1,2-Dibromoethane | ND | (0.00714) [3] | ND | (0.00736) [3] |
| 1,2-Dichloroethane | ND | (0.00959) [3] | ND | (0.00988) [3] |
| Carbon tetrachloride | ND | (0.0150) [3] | ND | (0.0154) [3] |
| Chloroform | 0.00518 | (0.00462) [3] | 0.00616 | (0.00476) [3] |
| Tetrachloroethene | 0.00542 | (0.00742) [3] | 0.00989 | (0.00764) [3] |
| Trichloroethene | 41.7 | (1.10) [3] | 55.3 | (1.13) [3] |
| Vinyl chloride | ND | (0.0244) [3] | ND | (0.0251) [3] |
| cis-1,2-Dichloroethene | 0.0389 | (0.0121) [3] | 0.0380 | (0.0125) [3] |
| T014 - Volatiles in Air (FID) (ppmV) | | | | |
| Benzene | ND | (0.00497) [3] | ND | (0.00512) [3] |
| Styrene | ND | (0.00348) [3] | 0.0147 | (0.00359) [3] |
| o-Xylene/1,1,2,2-TCA | ND | (0.00504) [3] | 0.00803 | (0.00519) [3] |
| p-Xylene/m-Xylene/Bromoform | ND | (0.0111) [3] | 0.0198 | (0.0114) [3] |

TABLE 1

RESULTS OF ORGANIC ANALYSES FOR AIR SAMPLES, AFP4 SPH3

Page: 1

| | SITE ID |
|--|--------------|
| | LOCATION ID |
| | SAMPLE ID |
| | DATE SAMPLED |

Bldg181
HDR_LINE
AFP4-SPH-SV19
09-NOV-2000

PARAMETER

| PARAMETER | | |
|---------------------------------------|---------|-----------------|
| ----- | | |
| T014 - Volatiles in Air (ELCD) (ppmV) | | |
| 1,1,1-Trichloroethane | 0.0111 | (0.00566) [3] |
| 1,1-Dichloroethene | ND | (0.00451) [3] |
| 1,2-Dibromoethane | ND | (0.00723) [3] |
| 1,2-Dichloroethane | ND | (0.00971) [3] |
| Carbon tetrachloride | ND | (0.0152) [3] |
| Chloroform | ND | (0.00468) [3] |
| Tetrachloroethene | 0.00319 | (0.00751) [3] |
| Trichloroethene | 28.8 | (1.11) [3] |
| Vinyl chloride | ND | (0.0247) [3] |
| cis-1,2-Dichloroethene | 0.0275 | (0.0123) [3] |
| | | |
| T014 - Volatiles in Air (FID) (ppmV) | | |
| Benzene | 0.00894 | (0.00503) [3] |
| Styrene | 0.0463 | (0.00353) [3] |
| o-Xylene/1,1,2,2-TCA | ND | (0.00510) [3] |
| p-Xylene/m-Xylene/Bromoform | ND | (0.0113) [3] |

Groundwater Sample Results

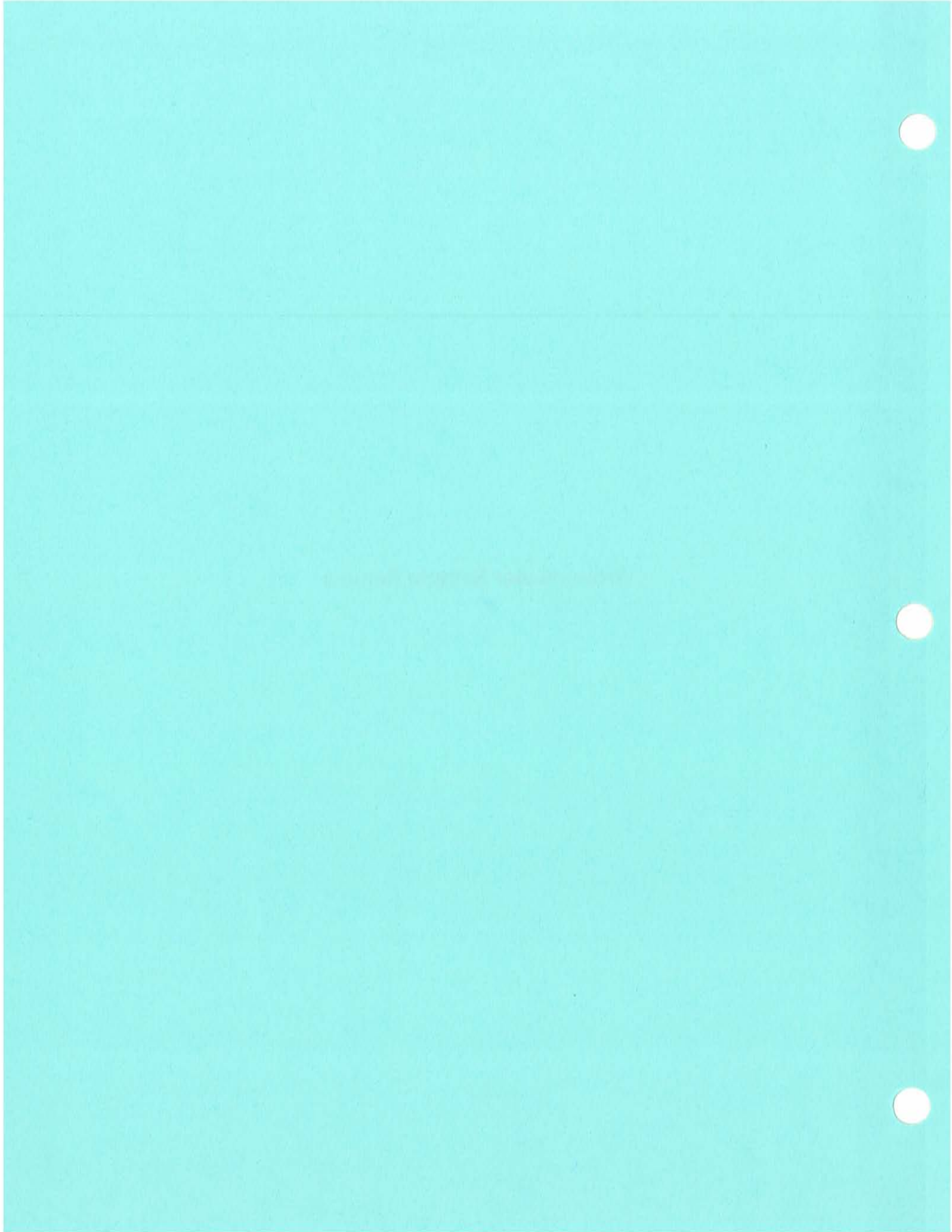


TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 1

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|---|----------|-------|---|----------|-------|---|----------|--------|---|----------|--------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA060 AFP4-SPH-GW01-0 02-MAY-2000 | | | Bldg181 WJETA066 AFP4-SPH-GW02-0 02-MAY-2000 | | | Bldg181 WJETA067 AFP4-SPH-GW03-0 02-MAY-2000 | | | Bldg181 WJETA058 AFP4-SPH-GW04-0 02-MAY-2000 | | |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (9.48) | [100] | ND | (9.48) | [100] | ND | (474) | [5000] | ND | (474) | [5000] |
| 1,1,1-Trichloroethane | ND | (3.31) | [100] | ND | (3.31) | [100] | ND | (166) | [5000] | ND | (166) | [5000] |
| 1,1,2,2-Tetrachloroethane | ND | (7.92) | [100] | ND | (7.92) | [100] | ND | (396) | [5000] | ND | (396) | [5000] |
| 1,1,2-Trichloroethane | ND | (9.52) | [100] | ND | (9.52) | [100] | ND | (476) | [5000] | ND | (476) | [5000] |
| 1,1-Dichloroethane | ND | (4.87) | [100] | ND | (4.87) | [100] | ND | (244) | [5000] | ND | (244) | [5000] |
| 1,1-Dichloroethene | ND | (6.97) | [100] | ND | (6.97) | [100] | ND | (348) | [5000] | ND | (348) | [5000] |
| 1,1-Dichloropropene | ND | (4.64) | [100] | ND | (4.64) | [100] | ND | (232) | [5000] | ND | (232) | [5000] |
| 1,2,3-Trichlorobenzene | ND | (46.7) | [100] | ND | (46.7) | [100] | ND | (2340) | [5000] | ND | (2340) | [5000] |
| 1,2,3-Trichloropropane | ND | (5.43) | [100] | ND | (5.43) | [100] | ND | (272) | [5000] | ND | (272) | [5000] |
| 1,2,4-Trichlorobenzene | ND | (11.8) | [100] | ND | (11.8) | [100] | ND | (590) | [5000] | ND | (590) | [5000] |
| 1,2,4-Trimethylbenzene | ND | (7.49) | [100] | ND | (7.49) | [100] | ND | (374) | [5000] | ND | (374) | [5000] |
| 1,2-Dibromo-3-chloropropane | ND | (105) | [100] | ND | (105) | [100] | ND | (5250) | [5000] | ND | (5250) | [5000] |
| 1,2-Dibromoethane | ND | (15.2) | [100] | ND | (15.2) | [100] | ND | (760) | [5000] | ND | (760) | [5000] |
| 1,2-Dichlorobenzene | ND | (9.20) | [100] | ND | (9.20) | [100] | ND | (460) | [5000] | ND | (460) | [5000] |
| 1,2-Dichloroethane | ND | (4.99) | [100] | ND | (4.99) | [100] | ND | (250) | [5000] | ND | (250) | [5000] |
| 1,2-Dichloropropane | ND | (6.70) | [100] | ND | (6.70) | [100] | ND | (335) | [5000] | ND | (335) | [5000] |
| 1,3,5-Trimethylbenzene | ND | (4.36) | [100] | ND | (4.36) | [100] | ND | (218) | [5000] | ND | (218) | [5000] |
| 1,3-Dichlorobenzene | ND | (5.91) | [100] | ND | (5.91) | [100] | ND | (296) | [5000] | ND | (296) | [5000] |
| 1,3-Dichloropropane | ND | (4.51) | [100] | ND | (4.51) | [100] | ND | (226) | [5000] | ND | (226) | [5000] |
| 1,4-Dichlorobenzene | ND | (5.87) | [100] | ND | (5.87) | [100] | ND | (294) | [5000] | ND | (294) | [5000] |
| 1-Chlorohexane | ND | (11.3) | [100] | ND | (11.3) | [100] | ND | (565) | [5000] | ND | (565) | [5000] |
| 2,2-Dichloropropane | ND | (7.14) | [100] | ND | (7.14) | [100] | ND | (357) | [5000] | ND | (357) | [5000] |
| 2-Chlorotoluene | ND | (11.3) | [100] | ND | (11.3) | [100] | ND | (565) | [5000] | ND | (565) | [5000] |
| 4-Chlorotoluene | ND | (7.62) | [100] | ND | (7.62) | [100] | ND | (381) | [5000] | ND | (381) | [5000] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 2

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|-----------------|--------|---------|-----------------|--------|---------|-----------------|--------|----------|-----------------|--------|----------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | WJETA060 | | | WJETA066 | | | WJETA067 | | | WJETA058 | | |
| | AFP4-SPH-GW01-0 | | | AFP4-SPH-GW02-0 | | | AFP4-SPH-GW03-0 | | | AFP4-SPH-GW04-0 | | |
| | 02-MAY-2000 | | | 02-MAY-2000 | | | 02-MAY-2000 | | | 02-MAY-2000 | | |
| ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (4.52 |) [100] | ND | (4.52 |) [100] | ND | (226 |) [5000] | ND | (226 |) [5000] |
| Benzene | ND | (4.92 |) [100] | ND | (4.92 |) [100] | ND | (246 |) [5000] | ND | (246 |) [5000] |
| Bromobenzene | ND | (6.22 |) [100] | ND | (6.22 |) [100] | ND | (311 |) [5000] | ND | (311 |) [5000] |
| Bromochloromethane | ND | (13.9 |) [100] | ND | (13.9 |) [100] | ND | (695 |) [5000] | ND | (695 |) [5000] |
| Bromodichloromethane | ND | (6.83 |) [100] | ND | (6.83 |) [100] | ND | (342 |) [5000] | ND | (342 |) [5000] |
| Bromoform | ND | (13.6 |) [100] | ND | (13.6 |) [100] | ND | (680 |) [5000] | ND | (680 |) [5000] |
| Bromomethane (Methylbromide) | ND | (10.6 |) [100] | ND | (10.6 |) [100] | ND | (530 |) [5000] | ND | (530 |) [5000] |
| Carbon tetrachloride | ND | (8.67 |) [100] | ND | (8.67 |) [100] | ND | (434 |) [5000] | ND | (434 |) [5000] |
| Chlorobenzene | ND | (4.73 |) [100] | ND | (4.73 |) [100] | ND | (236 |) [5000] | ND | (236 |) [5000] |
| Chloroethane | ND | (7.56 |) [100] | ND | (7.56 |) [100] | ND | (378 |) [5000] | ND | (378 |) [5000] |
| Chloroform | ND | (6.70 |) [100] | ND | (6.70 |) [100] | ND | (335 |) [5000] | ND | (335 |) [5000] |
| Chloromethane | ND | (8.21 |) [100] | ND | (8.21 |) [100] | ND | (410 |) [5000] | ND | (410 |) [5000] |
| Dibromochloromethane | ND | (5.64 |) [100] | ND | (5.64 |) [100] | ND | (282 |) [5000] | ND | (282 |) [5000] |
| Dibromomethane | ND | (9.39 |) [100] | ND | (9.39 |) [100] | ND | (470 |) [5000] | ND | (470 |) [5000] |
| Dichlorodifluoromethane | ND | (11.3 |) [100] | ND | (11.3 |) [100] | ND | (565 |) [5000] | ND | (565 |) [5000] |
| Ethylbenzene | ND | (5.52 |) [100] | ND | (5.52 |) [100] | ND | (276 |) [5000] | ND | (276 |) [5000] |
| Hexachloro-1,3-butadiene | ND | (21.2 |) [100] | ND | (21.2 |) [100] | ND | (1060 |) [5000] | ND | (1060 |) [5000] |
| Isopropylbenzene | ND | (4.74 |) [100] | ND | (4.74 |) [100] | ND | (237 |) [5000] | ND | (237 |) [5000] |
| Methylene chloride | ND | (7.96 |) [100] | ND | (7.96 |) [100] | ND | (398 |) [5000] | ND | (398 |) [5000] |
| Naphthalene | ND | (10.6 |) [100] | ND | (10.6 |) [100] | ND | (530 |) [5000] | ND | (530 |) [5000] |
| Styrene | ND | (7.22 |) [100] | ND | (7.22 |) [100] | ND | (361 |) [5000] | ND | (361 |) [5000] |
| Tetrachloroethene | ND | (5.68 |) [100] | ND | (5.68 |) [100] | ND | (284 |) [5000] | ND | (284 |) [5000] |
| Toluene | ND | (6.80 |) [100] | ND | (6.80 |) [100] | ND | (340 |) [5000] | ND | (340 |) [5000] |
| Trichloroethene | 5960 | (9.05 |) [100] | 9130 | (9.05 |) [100] | 285000 | (452 |) [5000] | 209000 | (452 |) [5000] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|---|----------|-------|---|----------|-------|---|----------|--------|---|----------|--------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA060 AFP4-SPH-GW01-0 02-MAY-2000 | | | Bldg181 WJETA066 AFP4-SPH-GW02-0 02-MAY-2000 | | | Bldg181 WJETA067 AFP4-SPH-GW03-0 02-MAY-2000 | | | Bldg181 WJETA058 AFP4-SPH-GW04-0 02-MAY-2000 | | |
| ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (20.8) | [100] | ND | (20.8) | [100] | ND | (1040) | [5000] | ND | (1040) | [5000] |
| Vinyl chloride | ND | (5.74) | [100] | ND | (5.74) | [100] | ND | (287) | [5000] | ND | (287) | [5000] |
| cis-1,2-Dichloroethene | 16.8 | (6.03) | [100] | ND | (6.03) | [100] | ND | (302) | [5000] | ND | (302) | [5000] |
| cis-1,3-Dichloropropene | ND | (3.66) | [100] | ND | (3.66) | [100] | ND | (183) | [5000] | ND | (183) | [5000] |
| n-Butylbenzene | ND | (6.42) | [100] | ND | (6.42) | [100] | ND | (321) | [5000] | ND | (321) | [5000] |
| n-Propylbenzene | ND | (8.86) | [100] | ND | (8.86) | [100] | ND | (443) | [5000] | ND | (443) | [5000] |
| o-Xylene | ND | (7.13) | [100] | ND | (7.13) | [100] | ND | (356) | [5000] | ND | (356) | [5000] |
| p-Xylene/m-Xylene | ND | (13.7) | [100] | ND | (13.7) | [100] | ND | (685) | [5000] | ND | (685) | [5000] |
| sec-Butylbenzene | ND | (7.45) | [100] | ND | (7.45) | [100] | ND | (372) | [5000] | ND | (372) | [5000] |
| tert-Butylbenzene | ND | (9.58) | [100] | ND | (9.58) | [100] | ND | (479) | [5000] | ND | (479) | [5000] |
| trans-1,2-Dichloroethene | ND | (8.13) | [100] | ND | (8.13) | [100] | ND | (406) | [5000] | ND | (406) | [5000] |
| trans-1,3-Dichloropropene | ND | (6.58) | [100] | ND | (6.58) | [100] | ND | (329) | [5000] | ND | (329) | [5000] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 4

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|---|--------|----------|---|--------|----------|---|--------|----------|---|--------|----------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA064 AFP4-SPH-GW05-0 02-MAY-2000 | | | Bldg181 WJETA059 AFP4-SPH-GW06-0 03-MAY-2000 | | | Bldg181 WJETA061 AFP4-SPH-GW07-0 03-MAY-2000 | | | Bldg181 WJETA065 AFP4-SPH-GW08-3 03-MAY-2000 | | |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (94.8 |) [1000] | ND | (94.8 |) [1000] | ND | (94.8 |) [1000] | ND | (190 |) [2000] |
| 1,1,1-Trichloroethane | ND | (33.1 |) [1000] | ND | (33.1 |) [1000] | ND | (33.1 |) [1000] | ND | (66.2 |) [2000] |
| 1,1,2,2-Tetrachloroethane | ND | (79.2 |) [1000] | ND | (79.2 |) [1000] | ND | (79.2 |) [1000] | ND | (158 |) [2000] |
| 1,1,2-Trichloroethane | ND | (95.2 |) [1000] | ND | (95.2 |) [1000] | ND | (95.2 |) [1000] | ND | (190 |) [2000] |
| 1,1-Dichloroethane | ND | (48.7 |) [1000] | ND | (48.7 |) [1000] | ND | (48.7 |) [1000] | ND | (97.4 |) [2000] |
| 1,1-Dichloroethene | ND | (69.7 |) [1000] | ND | (69.7 |) [1000] | ND | (69.7 |) [1000] | ND | (139 |) [2000] |
| 1,1-Dichloropropene | ND | (46.4 |) [1000] | ND | (46.4 |) [1000] | ND | (46.4 |) [1000] | ND | (92.8 |) [2000] |
| 1,2,3-Trichlorobenzene | ND | (467 |) [1000] | ND | (467 |) [1000] | ND | (467 |) [1000] | ND | (934 |) [2000] |
| 1,2,3-Trichloropropane | ND | (54.3 |) [1000] | ND | (54.3 |) [1000] | ND | (54.3 |) [1000] | ND | (109 |) [2000] |
| 1,2,4-Trichlorobenzene | ND | (118 |) [1000] | ND | (118 |) [1000] | ND | (118 |) [1000] | ND | (236 |) [2000] |
| 1,2,4-Trimethylbenzene | ND | (74.9 |) [1000] | ND | (74.9 |) [1000] | ND | (74.9 |) [1000] | ND | (150 |) [2000] |
| 1,2-Dibromo-3-chloropropane | ND | (1050 |) [1000] | ND | (1050 |) [1000] | ND | (1050 |) [1000] | ND | (2100 |) [2000] |
| 1,2-Dibromoethane | ND | (152 |) [1000] | ND | (152 |) [1000] | ND | (152 |) [1000] | ND | (304 |) [2000] |
| 1,2-Dichlorobenzene | ND | (92.0 |) [1000] | ND | (92.0 |) [1000] | ND | (92.0 |) [1000] | ND | (184 |) [2000] |
| 1,2-Dichloroethane | ND | (49.9 |) [1000] | ND | (49.9 |) [1000] | ND | (49.9 |) [1000] | ND | (99.8 |) [2000] |
| 1,2-Dichloropropane | ND | (67.0 |) [1000] | ND | (67.0 |) [1000] | ND | (67.0 |) [1000] | ND | (134 |) [2000] |
| 1,3,5-Trimethylbenzene | ND | (43.6 |) [1000] | ND | (43.6 |) [1000] | ND | (43.6 |) [1000] | ND | (87.2 |) [2000] |
| 1,3-Dichlorobenzene | ND | (59.1 |) [1000] | ND | (59.1 |) [1000] | ND | (59.1 |) [1000] | ND | (118 |) [2000] |
| 1,3-Dichloropropane | ND | (45.1 |) [1000] | ND | (45.1 |) [1000] | ND | (45.1 |) [1000] | ND | (90.2 |) [2000] |
| 1,4-Dichlorobenzene | ND | (58.7 |) [1000] | ND | (58.7 |) [1000] | ND | (58.7 |) [1000] | ND | (117 |) [2000] |
| 1-Chlorohexane | ND | (113 |) [1000] | ND | (113 |) [1000] | ND | (113 |) [1000] | ND | (226 |) [2000] |
| 2,2-Dichloropropane | ND | (71.4 |) [1000] | ND | (71.4 |) [1000] | ND | (71.4 |) [1000] | ND | (143 |) [2000] |
| 2-Chlorotoluene | ND | (113 |) [1000] | ND | (113 |) [1000] | ND | (113 |) [1000] | ND | (226 |) [2000] |
| 4-Chlorotoluene | ND | (76.2 |) [1000] | ND | (76.2 |) [1000] | ND | (76.2 |) [1000] | ND | (152 |) [2000] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 5

| PARAMETER | SITE ID | | | LOCATION ID | | | SAMPLE ID | | | DATE SAMPLED | | |
|--|-----------------|----------|--------|-----------------|----------|--------|-----------------|----------|--------|-----------------|----------|--------|
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | WJETA064 | | | WJETA059 | | | WJETA061 | | | WJETA065 | | |
| | AFP4-SPH-GW05-0 | | | AFP4-SPH-GW06-0 | | | AFP4-SPH-GW07-0 | | | AFP4-SPH-GW08-3 | | |
| | 02-MAY-2000 | | | 03-MAY-2000 | | | 03-MAY-2000 | | | 03-MAY-2000 | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (45.2) | [1000] | ND | (45.2) | [1000] | ND | (45.2) | [1000] | ND | (90.4) | [2000] |
| Benzene | ND | (49.2) | [1000] | ND | (49.2) | [1000] | ND | (49.2) | [1000] | ND | (98.4) | [2000] |
| Bromobenzene | ND | (62.2) | [1000] | ND | (62.2) | [1000] | ND | (62.2) | [1000] | ND | (124) | [2000] |
| Bromochloromethane | ND | (139) | [1000] | ND | (139) | [1000] | ND | (139) | [1000] | ND | (278) | [2000] |
| Bromodichloromethane | ND | (68.3) | [1000] | ND | (68.3) | [1000] | ND | (68.3) | [1000] | ND | (137) | [2000] |
| Bromoform | ND | (136) | [1000] | ND | (136) | [1000] | ND | (136) | [1000] | ND | (272) | [2000] |
| Bromomethane (Methylbromide) | ND | (106) | [1000] | ND | (106) | [1000] | ND | (106) | [1000] | ND | (212) | [2000] |
| Carbon tetrachloride | ND | (86.7) | [1000] | ND | (86.7) | [1000] | ND | (86.7) | [1000] | ND | (173) | [2000] |
| Chlorobenzene | ND | (47.3) | [1000] | ND | (47.3) | [1000] | ND | (47.3) | [1000] | ND | (94.6) | [2000] |
| Chloroethane | ND | (75.6) | [1000] | ND | (75.6) | [1000] | ND | (75.6) | [1000] | ND | (151) | [2000] |
| Chloroform | ND | (67.0) | [1000] | ND | (67.0) | [1000] | ND | (67.0) | [1000] | ND | (134) | [2000] |
| Chloromethane | ND | (82.1) | [1000] | ND | (82.1) | [1000] | ND | (82.1) | [1000] | ND | (164) | [2000] |
| Dibromochloromethane | ND | (56.4) | [1000] | ND | (56.4) | [1000] | ND | (56.4) | [1000] | ND | (113) | [2000] |
| Dibromomethane | ND | (93.9) | [1000] | ND | (93.9) | [1000] | ND | (93.9) | [1000] | ND | (188) | [2000] |
| Dichlorodifluoromethane | ND | (113) | [1000] | ND | (113) | [1000] | ND | (113) | [1000] | ND | (226) | [2000] |
| Ethylbenzene | ND | (55.2) | [1000] | ND | (55.2) | [1000] | ND | (55.2) | [1000] | ND | (110) | [2000] |
| Hexachloro-1,3-butadiene | ND | (212) | [1000] | ND | (212) | [1000] | ND | (212) | [1000] | ND | (424) | [2000] |
| Isopropylbenzene | ND | (47.4) | [1000] | ND | (47.4) | [1000] | ND | (47.4) | [1000] | ND | (94.8) | [2000] |
| Methylene chloride | ND | (79.6) | [1000] | ND | (79.6) | [1000] | ND | (79.6) | [1000] | ND | (159) | [2000] |
| Naphthalene | ND | (106) | [1000] | ND | (106) | [1000] | ND | (106) | [1000] | ND | (212) | [2000] |
| Styrene | ND | (72.2) | [1000] | ND | (72.2) | [1000] | ND | (72.2) | [1000] | ND | (144) | [2000] |
| Tetrachloroethene | ND | (56.8) | [1000] | ND | (56.8) | [1000] | ND | (56.8) | [1000] | ND | (114) | [2000] |
| Toluene | ND | (68.0) | [1000] | ND | (68.0) | [1000] | ND | (68.0) | [1000] | ND | (136) | [2000] |
| Trichloroethene | 38900 | (90.5) | [1000] | 9170 | (90.5) | [1000] | 41500 | (90.5) | [1000] | 81000 | (181) | [2000] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 6

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|-----------------|--------|----------|-----------------|--------|----------|-----------------|--------|----------|-----------------|--------|----------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | WJETA064 | | | WJETA059 | | | WJETA061 | | | WJETA065 | | |
| | AFP4-SPH-GW05-0 | | | AFP4-SPH-GW06-0 | | | AFP4-SPH-GW07-0 | | | AFP4-SPH-GW08-3 | | |
| | 02-MAY-2000 | | | 03-MAY-2000 | | | 03-MAY-2000 | | | 03-MAY-2000 | | |
| ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (208 |) [1000] | ND | (208 |) [1000] | ND | (208 |) [1000] | ND | (416 |) [2000] |
| Vinyl chloride | ND | (57.4 |) [1000] | ND | (57.4 |) [1000] | ND | (57.4 |) [1000] | ND | (115 |) [2000] |
| cis-1,2-Dichloroethene | ND | (60.3 |) [1000] | ND | (60.3 |) [1000] | ND | (60.3 |) [1000] | ND | (121 |) [2000] |
| cis-1,3-Dichloropropene | ND | (36.6 |) [1000] | ND | (36.6 |) [1000] | ND | (36.6 |) [1000] | ND | (73.2 |) [2000] |
| n-Butylbenzene | ND | (64.2 |) [1000] | ND | (64.2 |) [1000] | ND | (64.2 |) [1000] | ND | (128 |) [2000] |
| n-Propylbenzene | ND | (88.6 |) [1000] | ND | (88.6 |) [1000] | ND | (88.6 |) [1000] | ND | (177 |) [2000] |
| o-Xylene | ND | (71.3 |) [1000] | ND | (71.3 |) [1000] | ND | (71.3 |) [1000] | ND | (143 |) [2000] |
| p-Xylene/m-Xylene | ND | (137 |) [1000] | ND | (137 |) [1000] | ND | (137 |) [1000] | ND | (274 |) [2000] |
| sec-Butylbenzene | ND | (74.5 |) [1000] | ND | (74.5 |) [1000] | ND | (74.5 |) [1000] | ND | (149 |) [2000] |
| tert-Butylbenzene | ND | (95.8 |) [1000] | ND | (95.8 |) [1000] | ND | (95.8 |) [1000] | ND | (192 |) [2000] |
| trans-1,2-Dichloroethene | ND | (81.3 |) [1000] | ND | (81.3 |) [1000] | ND | (81.3 |) [1000] | ND | (163 |) [2000] |
| trans-1,3-Dichloropropene | ND | (65.8 |) [1000] | ND | (65.8 |) [1000] | ND | (65.8 |) [1000] | ND | (132 |) [2000] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 7

| PARAMETER | Bldg181 WJETA065 AFP4-SPH-GW08-1 Dup of AFP4-SPH-GW08-3 03-MAY-2000 | | | Bldg181 WJETA062 AFP4-SPH-GW09-0 03-MAY-2000 | | | Bldg181 WJETA063 AFP4-SPH-GW10-0 03-MAY-2000 | | |
|-----------------------------|---|----------|--------|---|----------|--------|---|----------|-------|
| | SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (190) | [2000] | ND | (94.8) | [1000] | ND | (41.6) | [500] |
| 1,1,1-Trichloroethane | ND | (66.2) | [2000] | ND | (33.1) | [1000] | ND | (9.15) | [500] |
| 1,1,2,2-Tetrachloroethane | ND | (158) | [2000] | ND | (79.2) | [1000] | ND | (38.7) | [500] |
| 1,1,2-Trichloroethane | ND | (190) | [2000] | ND | (95.2) | [1000] | ND | (66.5) | [500] |
| 1,1-Dichloroethane | ND | (97.4) | [2000] | ND | (48.7) | [1000] | ND | (20.8) | [500] |
| 1,1-Dichloroethene | ND | (139) | [2000] | ND | (69.7) | [1000] | ND | (21.8) | [500] |
| 1,1-Dichloropropene | ND | (92.8) | [2000] | ND | (46.4) | [1000] | ND | (28.2) | [500] |
| 1,2,3-Trichlorobenzene | ND | (934) | [2000] | ND | (467) | [1000] | ND | (132) | [500] |
| 1,2,3-Trichloropropane | ND | (109) | [2000] | ND | (54.3) | [1000] | ND | (42.2) | [500] |
| 1,2,4-Trichlorobenzene | ND | (236) | [2000] | ND | (118) | [1000] | ND | (88.5) | [500] |
| 1,2,4-Trimethylbenzene | ND | (150) | [2000] | ND | (74.9) | [1000] | ND | (23.9) | [500] |
| 1,2-Dibromo-3-chloropropane | ND | (2100) | [2000] | ND | (1050) | [1000] | ND | (590) | [500] |
| 1,2-Dibromoethane | ND | (304) | [2000] | ND | (152) | [1000] | ND | (35.6) | [500] |
| 1,2-Dichlorobenzene | ND | (184) | [2000] | ND | (92.0) | [1000] | ND | (24.4) | [500] |
| 1,2-Dichloroethane | ND | (99.8) | [2000] | ND | (49.9) | [1000] | ND | (31.0) | [500] |
| 1,2-Dichloropropane | ND | (134) | [2000] | ND | (67.0) | [1000] | ND | (16.0) | [500] |
| 1,3,5-Trimethylbenzene | ND | (87.2) | [2000] | ND | (43.6) | [1000] | ND | (19.6) | [500] |
| 1,3-Dichlorobenzene | ND | (118) | [2000] | ND | (59.1) | [1000] | ND | (23.4) | [500] |
| 1,3-Dichloropropane | ND | (90.2) | [2000] | ND | (45.1) | [1000] | ND | (39.4) | [500] |
| 1,4-Dichlorobenzene | ND | (117) | [2000] | ND | (58.7) | [1000] | ND | (24.6) | [500] |
| 1-Chlorohexane | ND | (226) | [2000] | ND | (113) | [1000] | ND | (44.2) | [500] |
| 2,2-Dichloropropane | ND | (143) | [2000] | ND | (71.4) | [1000] | ND | (33.5) | [500] |
| 2-Chlorotoluene | ND | (226) | [2000] | ND | (113) | [1000] | ND | (34.4) | [500] |
| 4-Chlorotoluene | ND | (152) | [2000] | ND | (76.2) | [1000] | ND | (39.4) | [500] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 8

| PARAMETER | SITE ID | | | | | | | | |
|--|---|----------|--------|---|----------|--------|---|----------|-------|
| | LOCATION ID | | | | | | | | |
| | SAMPLE ID | | | | | | | | |
| | DATE SAMPLED | | | | | | | | |
| | Bldg181 WJETA065 AFP4-SPH-GW08-1 Dup of AFP4-SPH-GW08-3 03-MAY-2000 | | | Bldg181 WJETA062 AFP4-SPH-GW09-0 03-MAY-2000 | | | Bldg181 WJETA063 AFP4-SPH-GW10-0 03-MAY-2000 | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | |
| 4-Isopropyltoluene | ND | (90.4) | [2000] | ND | (45.2) | [1000] | ND | (26.6) | [500] |
| Benzene | ND | (98.4) | [2000] | ND | (49.2) | [1000] | ND | (17.6) | [500] |
| Bromobenzene | ND | (124) | [2000] | ND | (62.2) | [1000] | ND | (40.1) | [500] |
| Bromochloromethane | ND | (278) | [2000] | ND | (139) | [1000] | ND | (40.5) | [500] |
| Bromodichloromethane | ND | (137) | [2000] | ND | (68.3) | [1000] | ND | (28.4) | [500] |
| Bromoform | ND | (272) | [2000] | ND | (136) | [1000] | ND | (59.0) | [500] |
| Bromomethane (Methylbromide) | ND | (212) | [2000] | ND | (106) | [1000] | ND | (42.2) | [500] |
| Carbon tetrachloride | ND | (173) | [2000] | ND | (86.7) | [1000] | ND | (46.5) | [500] |
| Chlorobenzene | ND | (94.6) | [2000] | ND | (47.3) | [1000] | ND | (12.9) | [500] |
| Chloroethane | ND | (151) | [2000] | ND | (75.6) | [1000] | ND | (35.0) | [500] |
| Chloroform | ND | (134) | [2000] | ND | (67.0) | [1000] | ND | (35.6) | [500] |
| Chloromethane | ND | (164) | [2000] | ND | (82.1) | [1000] | ND | (65.0) | [500] |
| Dibromochloromethane | ND | (113) | [2000] | ND | (56.4) | [1000] | ND | (23.4) | [500] |
| Dibromomethane | ND | (188) | [2000] | ND | (93.9) | [1000] | ND | (57.0) | [500] |
| Dichlorodifluoromethane | ND | (226) | [2000] | ND | (113) | [1000] | ND | (87.5) | [500] |
| Ethylbenzene | ND | (110) | [2000] | ND | (55.2) | [1000] | ND | (27.0) | [500] |
| Hexachloro-1,3-butadiene | ND | (424) | [2000] | ND | (212) | [1000] | ND | (184) | [500] |
| Isopropylbenzene | ND | (94.8) | [2000] | ND | (47.4) | [1000] | ND | (18.0) | [500] |
| Methylene chloride | ND | (159) | [2000] | ND | (79.6) | [1000] | 132 | (39.4) | [500] |
| Naphthalene | ND | (212) | [2000] | ND | (106) | [1000] | ND | (56.0) | [500] |
| Styrene | ND | (144) | [2000] | ND | (72.2) | [1000] | ND | (26.2) | [500] |
| Tetrachloroethene | ND | (114) | [2000] | ND | (56.8) | [1000] | ND | (54.5) | [500] |
| Toluene | ND | (136) | [2000] | ND | (68.0) | [1000] | ND | (18.0) | [500] |
| Trichloroethene | 82600 | (181) | [2000] | 34300 | (90.5) | [1000] | 19700 | (24.7) | [500] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 9

| PARAMETER | Bldg181 | | | Bldg181 | | | Bldg181 | | |
|--|------------------------|----------|--------|-----------------|----------|--------|-----------------|----------|-------|
| | WJETA065 | | | WJETA062 | | | WJETA063 | | |
| | AFP4-SPH-GW08-1 Dup of | | | AFP4-SPH-GW09-0 | | | AFP4-SPH-GW10-0 | | |
| | AFP4-SPH-GW08-3 | | | | | | | | |
| | 03-MAY-2000 | | | 03-MAY-2000 | | | 03-MAY-2000 | | |
| ----- | ----- | | | ----- | | | ----- | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | |
| Trichlorofluoromethane | ND | (416) | [2000] | ND | (208) | [1000] | ND | (33.2) | [500] |
| Vinyl chloride | ND | (115) | [2000] | ND | (57.4) | [1000] | ND | (27.8) | [500] |
| cis-1,2-Dichloroethene | ND | (121) | [2000] | ND | (60.3) | [1000] | ND | (21.8) | [500] |
| cis-1,3-Dichloropropene | ND | (73.2) | [2000] | ND | (36.6) | [1000] | ND | (24.3) | [500] |
| n-Butylbenzene | ND | (128) | [2000] | ND | (64.2) | [1000] | ND | (38.0) | [500] |
| n-Propylbenzene | ND | (177) | [2000] | ND | (88.6) | [1000] | ND | (41.2) | [500] |
| o-Xylene | ND | (143) | [2000] | ND | (71.3) | [1000] | ND | (18.0) | [500] |
| p-Xylene/m-Xylene | ND | (274) | [2000] | ND | (137) | [1000] | ND | (43.0) | [500] |
| sec-Butylbenzene | ND | (149) | [2000] | ND | (74.5) | [1000] | ND | (33.6) | [500] |
| tert-Butylbenzene | ND | (192) | [2000] | ND | (95.8) | [1000] | ND | (13.3) | [500] |
| trans-1,2-Dichloroethene | ND | (163) | [2000] | ND | (81.3) | [1000] | ND | (45.3) | [500] |
| trans-1,3-Dichloropropene | ND | (132) | [2000] | ND | (65.8) | [1000] | ND | (39.6) | [500] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 1

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|---|------------|-----|---|------------|-----|---|------------|-----|---|-----------|-----|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA062 AFP4-SPH-GW11-0 29-AUG-2000 | | | Bldg181 WJETA065 AFP4-SPH-GW12-0 29-AUG-2000 | | | Bldg181 WJETA067 AFP4-SPH-GW13-0 29-AUG-2000 | | | Bldg181 WJETA062 AFP4-SPH-GW14-0 21-SEP-2000 | | |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (0.0948) | [1] | ND | (0.0948) | [1] | ND | (0.0948) | [1] | ND | (0.555) | [5] |
| 1,1,1-Trichloroethane | ND | (0.0331) | [1] | ND | (0.0331) | [1] | ND | (0.0331) | [1] | ND | (0.845) | [5] |
| 1,1,2,2-Tetrachloroethane | ND | (0.0792) | [1] | ND | (0.0792) | [1] | ND | (0.0792) | [1] | ND | (0.435) | [5] |
| 1,1,2-Trichloroethane | ND | (0.0952) | [1] | ND | (0.0952) | [1] | ND | (0.0952) | [1] | ND | (0.410) | [5] |
| 1,1-Dichloroethane | ND | (0.0487) | [1] | ND | (0.0487) | [1] | ND | (0.0487) | [1] | ND | (0.620) | [5] |
| 1,1-Dichloroethene | ND | (0.0697) | [1] | 1.38 | (0.0697) | [1] | ND | (0.0697) | [1] | ND | (0.610) | [5] |
| 1,1-Dichloropropene | ND | (0.0464) | [1] | ND | (0.0464) | [1] | ND | (0.0464) | [1] | ND | (0.497) | [5] |
| 1,2,3-Trichlorobenzene | ND | (0.467) | [1] | ND | (0.467) | [1] | ND | (0.467) | [1] | ND | (2.76) | [5] |
| 1,2,3-Trichloropropane | ND | (0.0543) | [1] | ND | (0.0543) | [1] | ND | (0.0543) | [1] | ND | (1.44) | [5] |
| 1,2,4-Trichlorobenzene | ND | (0.118) | [1] | ND | (0.118) | [1] | ND | (0.118) | [1] | ND | (0.675) | [5] |
| 1,2,4-Trimethylbenzene | ND | (0.0749) | [1] | ND | (0.0749) | [1] | ND | (0.0749) | [1] | ND | (0.620) | [5] |
| 1,2-Dibromo-3-chloropropane | ND | (1.05) | [1] | ND | (1.05) | [1] | ND | (1.05) | [1] | ND | (2.74) | [5] |
| 1,2-Dibromoethane | ND | (0.152) | [1] | ND | (0.152) | [1] | ND | (0.152) | [1] | ND | (0.685) | [5] |
| 1,2-Dichlorobenzene | ND | (0.0920) | [1] | 0.565 | (0.0920) | [1] | ND | (0.0920) | [1] | ND | (0.482) | [5] |
| 1,2-Dichloroethane | ND | (0.0499) | [1] | 0.934 | (0.0499) | [1] | ND | (0.0499) | [1] | ND | (0.510) | [5] |
| 1,2-Dichloropropane | ND | (0.0670) | [1] | ND | (0.0670) | [1] | ND | (0.0670) | [1] | ND | (0.434) | [5] |
| 1,3,5-Trimethylbenzene | ND | (0.0436) | [1] | ND | (0.0436) | [1] | ND | (0.0436) | [1] | ND | (0.452) | [5] |
| 1,3-Dichlorobenzene | ND | (0.0591) | [1] | ND | (0.0591) | [1] | ND | (0.0591) | [1] | ND | (0.423) | [5] |
| 1,3-Dichloropropane | ND | (0.0451) | [1] | ND | (0.0451) | [1] | ND | (0.0451) | [1] | ND | (0.675) | [5] |
| 1,4-Dichlorobenzene | ND | (0.0587) | [1] | ND | (0.0587) | [1] | ND | (0.0587) | [1] | ND | (0.750) | [5] |
| 1-Chlorohexane | ND | (0.113) | [1] | ND | (0.113) | [1] | ND | (0.113) | [1] | ND | (0.469) | [5] |
| 2,2-Dichloropropane | ND | (0.0714) | [1] | ND | (0.0714) | [1] | ND | (0.0714) | [1] | ND | (0.800) | [5] |
| 2-Chlorotoluene | ND | (0.113) | [1] | ND | (0.113) | [1] | ND | (0.113) | [1] | ND | (0.890) | [5] |
| 4-Chlorotoluene | ND | (0.0762) | [1] | ND | (0.0762) | [1] | ND | (0.0762) | [1] | ND | (0.487) | [5] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 2

| PARAMETER | SITE ID | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|------------|-------|-------|---|--------|-------|------------|---|-----|-----------|-----|---|--|--|--|--|--|--|--|--|--|--|--|--|
| | LOCATION ID | | | | | | | | | | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | | | | | | | | | | |
| | Bldg181 WJETA062 AFP4-SPH-GW11-0 29-AUG-2000 | | | | Bldg181 WJETA065 AFP4-SPH-GW12-0 29-AUG-2000 | | | | Bldg181 WJETA067 AFP4-SPH-GW13-0 29-AUG-2000 | | | | Bldg181 WJETA062 AFP4-SPH-GW14-0 21-SEP-2000 | | | | | | | | | | | | |
| ----- | | | | | | | | | | | | | ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (0.0452) | [1] | ND | (0.0452) | [1] | ND | (0.0452) | [1] | ND | (0.575) | [5] | | | | | | | | | | | | | |
| Benzene | ND | (0.0492) | [1] | 0.531 | (0.0492) | [1] | ND | (0.0492) | [1] | ND | (0.320) | [5] | | | | | | | | | | | | | |
| Bromobenzene | ND | (0.0622) | [1] | ND | (0.0622) | [1] | ND | (0.0622) | [1] | ND | (0.499) | [5] | | | | | | | | | | | | | |
| Bromochloromethane | ND | (0.139) | [1] | ND | (0.139) | [1] | ND | (0.139) | [1] | ND | (0.655) | [5] | | | | | | | | | | | | | |
| Bromodichloromethane | ND | (0.0683) | [1] | 3.11 | (0.0683) | [1] | ND | (0.0683) | [1] | ND | (0.590) | [5] | | | | | | | | | | | | | |
| Bromoform | ND | (0.136) | [1] | ND | (0.136) | [1] | ND | (0.136) | [1] | ND | (0.850) | [5] | | | | | | | | | | | | | |
| Bromomethane (Methylbromide) | ND | (0.106) | [1] | ND | (0.106) | [1] | ND | (0.106) | [1] | ND | (0.995) | [5] | | | | | | | | | | | | | |
| Carbon tetrachloride | ND | (0.0867) | [1] | ND | (0.0867) | [1] | ND | (0.0867) | [1] | ND | (0.326) | [5] | | | | | | | | | | | | | |
| Chlorobenzene | ND | (0.0473) | [1] | ND | (0.0473) | [1] | ND | (0.0473) | [1] | ND | (0.421) | [5] | | | | | | | | | | | | | |
| Chloroethane | ND | (0.0756) | [1] | ND | (0.0756) | [1] | ND | (0.0756) | [1] | ND | (0.462) | [5] | | | | | | | | | | | | | |
| Chloroform | 2.26 | (0.0670) | [1] | 2.34 | (0.0670) | [1] | 0.658 | (0.0670) | [1] | ND | (0.448) | [5] | | | | | | | | | | | | | |
| Chloromethane | ND | (0.0821) | [1] | ND | (0.0821) | [1] | ND | (0.0821) | [1] | ND | (0.635) | [5] | | | | | | | | | | | | | |
| Dibromochloromethane | ND | (0.0564) | [1] | ND | (0.0564) | [1] | ND | (0.0564) | [1] | ND | (0.700) | [5] | | | | | | | | | | | | | |
| Dibromomethane | ND | (0.0939) | [1] | ND | (0.0939) | [1] | ND | (0.0939) | [1] | ND | (0.740) | [5] | | | | | | | | | | | | | |
| Dichlorodifluoromethane | ND | (0.113) | [1] | ND | (0.113) | [1] | ND | (0.113) | [1] | ND | (1.18) | [5] | | | | | | | | | | | | | |
| Ethylbenzene | ND | (0.0552) | [1] | ND | (0.0552) | [1] | ND | (0.0552) | [1] | ND | (0.680) | [5] | | | | | | | | | | | | | |
| Hexachloro-1,3-butadiene | ND | (0.212) | [1] | ND | (0.212) | [1] | ND | (0.212) | [1] | ND | (1.66) | [5] | | | | | | | | | | | | | |
| Isopropylbenzene | ND | (0.0474) | [1] | ND | (0.0474) | [1] | ND | (0.0474) | [1] | ND | (0.466) | [5] | | | | | | | | | | | | | |
| Methylene chloride | ND | (0.0796) | [1] | ND | (0.0796) | [1] | ND | (0.0796) | [1] | ND | (0.630) | [5] | | | | | | | | | | | | | |
| Naphthalene | ND | (0.106) | [1] | ND | (0.106) | [1] | ND | (0.106) | [1] | ND | (0.400) | [5] | | | | | | | | | | | | | |
| Styrene | ND | (0.0722) | [1] | ND | (0.0722) | [1] | ND | (0.0722) | [1] | ND | (0.488) | [5] | | | | | | | | | | | | | |
| Tetrachloroethene | ND | (0.0568) | [1] | 5.55 | (0.0568) | [1] | 2.24 | (0.0568) | [1] | ND | (0.720) | [5] | | | | | | | | | | | | | |
| Toluene | ND | (0.0680) | [1] | ND | (0.0680) | [1] | ND | (0.0680) | [1] | ND | (0.318) | [5] | | | | | | | | | | | | | |
| Trichloroethene | 3750 | (9.05) | [100] | 21900 | (90.5) | [1000] | 9270 | (90.5) | [1000] | 166 | (0.685) | [5] | | | | | | | | | | | | | |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 3

| PARAMETER | SITE ID | | | | | | | | | | | | | | | | | | | |
|--|-----------------|---|--------|-----------------|-----|------|-----------------|--------|---|-----------------|-------|---|--------|---|-----|----|---|-------|---|-----|
| | LOCATION ID | | | | | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | | | | | | | | | |
| | WJETA062 | | | WJETA065 | | | WJETA067 | | | WJETA062 | | | | | | | | | | |
| | AFP4-SPH-GW11-0 | | | AFP4-SPH-GW12-0 | | | AFP4-SPH-GW13-0 | | | AFP4-SPH-GW14-0 | | | | | | | | | | |
| | 29-AUG-2000 | | | 29-AUG-2000 | | | 29-AUG-2000 | | | 21-SEP-2000 | | | | | | | | | | |
| ----- | ----- | | | | | | | | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (| 0.208 |) | [1] | ND | (| 0.208 |) | [1] | ND | (| 0.530 |) | [5] | | | | | |
| Vinyl chloride | ND | (| 0.0574 |) | [1] | ND | (| 0.0574 |) | [1] | ND | (| 0.570 |) | [5] | | | | | |
| cis-1,2-Dichloroethene | 3.13 | (| 0.0603 |) | [1] | 8.05 | (| 0.0603 |) | [1] | 1.62 | (| 0.0603 |) | [1] | ND | (| 0.560 |) | [5] |
| cis-1,3-Dichloropropene | ND | (| 0.0366 |) | [1] | ND | (| 0.0366 |) | [1] | ND | (| 0.0366 |) | [1] | ND | (| 0.409 |) | [5] |
| n-Butylbenzene | ND | (| 0.0642 |) | [1] | ND | (| 0.0642 |) | [1] | ND | (| 0.0642 |) | [1] | ND | (| 0.510 |) | [5] |
| n-Propylbenzene | ND | (| 0.0886 |) | [1] | ND | (| 0.0886 |) | [1] | ND | (| 0.0886 |) | [1] | ND | (| 0.700 |) | [5] |
| o-Xylene | ND | (| 0.0713 |) | [1] | ND | (| 0.0713 |) | [1] | ND | (| 0.0713 |) | [1] | ND | (| 0.422 |) | [5] |
| p-Xylene/m-Xylene | ND | (| 0.137 |) | [1] | ND | (| 0.137 |) | [1] | ND | (| 0.137 |) | [1] | ND | (| 0.835 |) | [5] |
| sec-Butylbenzene | ND | (| 0.0745 |) | [1] | ND | (| 0.0745 |) | [1] | ND | (| 0.0745 |) | [1] | ND | (| 0.525 |) | [5] |
| tert-Butylbenzene | ND | (| 0.0958 |) | [1] | ND | (| 0.0958 |) | [1] | ND | (| 0.0958 |) | [1] | ND | (| 0.456 |) | [5] |
| trans-1,2-Dichloroethene | ND | (| 0.0813 |) | [1] | ND | (| 0.0813 |) | [1] | 0.808 | (| 0.0813 |) | [1] | ND | (| 0.595 |) | [5] |
| trans-1,3-Dichloropropene | ND | (| 0.0658 |) | [1] | ND | (| 0.0658 |) | [1] | ND | (| 0.0658 |) | [1] | ND | (| 0.454 |) | [5] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 4

| PARAMETER | SITE ID | | | | LOCATION ID | | | | SAMPLE ID | | | | DATE SAMPLED | | | |
|---|-----------------|----------|------|----|-----------------|------|----|-----------|-----------------|----|-----------|------|-----------------|-----------|------|----|
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | |
| | WJETA065 | | | | WJETA067 | | | | WJETA058 | | | | WJETA059 | | | |
| | AFP4-SPH-GW15-0 | | | | AFP4-SPH-GW16-0 | | | | AFP4-SPH-GW17-0 | | | | AFP4-SPH-GW18-0 | | | |
| | 21-SEP-2000 | | | | 21-SEP-2000 | | | | 03-OCT-2000 | | | | 03-OCT-2000 | | | |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (2.22) | [20] | ND | (1.11) | [10] | ND | (1.66) | [20] | ND | (1.66) | [20] | ND | (1.66) | [20] | ND |
| 1,1,1-Trichloroethane | ND | (3.38) | [20] | ND | (1.69) | [10] | ND | (0.366) | [20] | ND | (0.366) | [20] | ND | (0.366) | [20] | ND |
| 1,1,2,2-Tetrachloroethane | ND | (1.74) | [20] | ND | (0.870) | [10] | ND | (1.55) | [20] | ND | (1.55) | [20] | ND | (1.55) | [20] | ND |
| 1,1,2-Trichloroethane | ND | (1.64) | [20] | ND | (0.821) | [10] | ND | (2.66) | [20] | ND | (2.66) | [20] | ND | (2.66) | [20] | ND |
| 1,1-Dichloroethane | ND | (2.48) | [20] | ND | (1.24) | [10] | ND | (0.832) | [20] | ND | (0.832) | [20] | ND | (0.832) | [20] | ND |
| 1,1-Dichloroethene | ND | (2.44) | [20] | ND | (1.22) | [10] | ND | (0.872) | [20] | ND | (0.872) | [20] | ND | (0.872) | [20] | ND |
| 1,1-Dichloropropene | ND | (1.99) | [20] | ND | (0.994) | [10] | ND | (1.13) | [20] | ND | (1.13) | [20] | ND | (1.13) | [20] | ND |
| 1,2,3-Trichlorobenzene | ND | (11.0) | [20] | ND | (5.51) | [10] | ND | (5.26) | [20] | ND | (5.26) | [20] | ND | (5.26) | [20] | ND |
| 1,2,3-Trichloropropane | ND | (5.76) | [20] | ND | (2.88) | [10] | ND | (1.69) | [20] | ND | (1.69) | [20] | ND | (1.69) | [20] | ND |
| 1,2,4-Trichlorobenzene | ND | (2.70) | [20] | ND | (1.35) | [10] | ND | (3.54) | [20] | ND | (3.54) | [20] | ND | (3.54) | [20] | ND |
| 1,2,4-Trimethylbenzene | ND | (2.48) | [20] | ND | (1.24) | [10] | ND | (0.956) | [20] | ND | (0.956) | [20] | ND | (0.956) | [20] | ND |
| 1,2-Dibromo-3-chloropropane | ND | (11.0) | [20] | ND | (5.48) | [10] | ND | (23.6) | [20] | ND | (23.6) | [20] | ND | (23.6) | [20] | ND |
| 1,2-Dibromoethane | ND | (2.74) | [20] | ND | (1.37) | [10] | ND | (1.43) | [20] | ND | (1.43) | [20] | ND | (1.43) | [20] | ND |
| 1,2-Dichlorobenzene | ND | (1.93) | [20] | ND | (0.965) | [10] | ND | (0.976) | [20] | ND | (0.976) | [20] | ND | (0.976) | [20] | ND |
| 1,2-Dichloroethane | ND | (2.04) | [20] | ND | (1.02) | [10] | ND | (1.24) | [20] | ND | (1.24) | [20] | ND | (1.24) | [20] | ND |
| 1,2-Dichloropropane | ND | (1.74) | [20] | ND | (0.869) | [10] | ND | (0.642) | [20] | ND | (0.642) | [20] | ND | (0.642) | [20] | ND |
| 1,3,5-Trimethylbenzene | ND | (1.81) | [20] | ND | (0.905) | [10] | ND | (0.786) | [20] | ND | (0.786) | [20] | ND | (0.786) | [20] | ND |
| 1,3-Dichlorobenzene | ND | (1.69) | [20] | ND | (0.846) | [10] | ND | (0.934) | [20] | ND | (0.934) | [20] | ND | (0.934) | [20] | ND |
| 1,3-Dichloropropane | ND | (2.70) | [20] | ND | (1.35) | [10] | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] | ND |
| 1,4-Dichlorobenzene | ND | (3.00) | [20] | ND | (1.50) | [10] | ND | (0.986) | [20] | ND | (0.986) | [20] | ND | (0.986) | [20] | ND |
| 1-Chlorohexane | ND | (1.88) | [20] | ND | (0.938) | [10] | ND | (1.77) | [20] | ND | (1.77) | [20] | ND | (1.77) | [20] | ND |
| 2,2-Dichloropropane | ND | (3.20) | [20] | ND | (1.60) | [10] | ND | (1.34) | [20] | ND | (1.34) | [20] | ND | (1.34) | [20] | ND |
| 2-Chlorotoluene | ND | (3.56) | [20] | ND | (1.78) | [10] | ND | (1.38) | [20] | ND | (1.38) | [20] | ND | (1.38) | [20] | ND |
| 4-Chlorotoluene | ND | (1.95) | [20] | ND | (0.974) | [10] | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] | ND |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 5

| PARAMETER | SITE ID | | LOCATION ID | | SAMPLE ID | | DATE SAMPLED | | | |
|--|-----------------|---------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|----|----------------|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | Bldg181 | | Bldg181 | | Bldg181 | | Bldg181 | | | |
| | WJETA065 | | WJETA067 | | WJETA058 | | WJETA059 | | | |
| | AFP4-SPH-GW15-0 | | AFP4-SPH-GW16-0 | | AFP4-SPH-GW17-0 | | AFP4-SPH-GW18-0 | | | |
| | 21-SEP-2000 | | 21-SEP-2000 | | 03-OCT-2000 | | 03-OCT-2000 | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (2.30) [20] | ND | (1.15) [10] | ND | (1.06) [20] | ND | (1.06) [20] | ND | (1.06) [20] |
| Benzene | ND | (1.28) [20] | ND | (0.641) [10] | ND | (0.706) [20] | ND | (0.706) [20] | ND | (0.706) [20] |
| Bromobenzene | ND | (2.00) [20] | ND | (0.998) [10] | ND | (1.60) [20] | ND | (1.60) [20] | ND | (1.60) [20] |
| Bromochloromethane | ND | (2.62) [20] | ND | (1.31) [10] | ND | (1.62) [20] | ND | (1.62) [20] | ND | (1.62) [20] |
| Bromodichloromethane | ND | (2.36) [20] | ND | (1.18) [10] | ND | (1.13) [20] | ND | (1.13) [20] | ND | (1.13) [20] |
| Bromoform | ND | (3.40) [20] | ND | (1.70) [10] | ND | (2.36) [20] | ND | (2.36) [20] | ND | (2.36) [20] |
| Bromomethane (Methylbromide) | ND | (3.98) [20] | ND | (1.99) [10] | ND | (1.69) [20] | ND | (1.69) [20] | ND | (1.69) [20] |
| Carbon tetrachloride | ND | (1.30) [20] | ND | (0.652) [10] | ND | (1.86) [20] | ND | (1.86) [20] | ND | (1.86) [20] |
| Chlorobenzene | ND | (1.68) [20] | ND | (0.842) [10] | ND | (0.516) [20] | ND | (0.516) [20] | ND | (0.516) [20] |
| Chloroethane | ND | (1.85) [20] | ND | (0.925) [10] | ND | (1.40) [20] | ND | (1.40) [20] | ND | (1.40) [20] |
| Chloroform | ND | (1.79) [20] | ND | (0.896) [10] | ND | (1.42) [20] | ND | (1.42) [20] | ND | (1.42) [20] |
| Chloromethane | ND | (2.54) [20] | ND | (1.27) [10] | ND | (2.60) [20] | ND | (2.60) [20] | ND | (2.60) [20] |
| Dibromochloromethane | ND | (2.80) [20] | ND | (1.40) [10] | ND | (0.938) [20] | ND | (0.938) [20] | ND | (0.938) [20] |
| Dibromomethane | ND | (2.96) [20] | ND | (1.48) [10] | ND | (2.28) [20] | ND | (2.28) [20] | ND | (2.28) [20] |
| Dichlorodifluoromethane | ND | (4.74) [20] | ND | (2.37) [10] | ND | (3.50) [20] | ND | (3.50) [20] | ND | (3.50) [20] |
| Ethylbenzene | ND | (2.72) [20] | ND | (1.36) [10] | ND | (1.08) [20] | ND | (1.08) [20] | ND | (1.08) [20] |
| Hexachloro-1,3-butadiene | ND | (6.62) [20] | ND | (3.31) [10] | ND | (7.38) [20] | ND | (7.38) [20] | ND | (7.38) [20] |
| Isopropylbenzene | ND | (1.86) [20] | ND | (0.931) [10] | ND | (0.722) [20] | ND | (0.722) [20] | ND | (0.722) [20] |
| Methylene chloride | ND | (2.52) [20] | ND | (1.26) [10] | ND | (1.58) [20] | ND | (1.58) [20] | ND | (1.58) [20] |
| Naphthalene | ND | (1.60) [20] | ND | (0.801) [10] | ND | (2.24) [20] | ND | (2.24) [20] | ND | (2.24) [20] |
| Styrene | ND | (1.95) [20] | ND | (0.977) [10] | ND | (1.05) [20] | ND | (1.05) [20] | ND | (1.05) [20] |
| Tetrachloroethene | ND | (2.88) [20] | ND | (1.44) [10] | 9.09 | (2.18) [20] | ND | (2.18) [20] | ND | (2.18) [20] |
| Toluene | ND | (1.27) [20] | ND | (0.637) [10] | ND | (0.718) [20] | ND | (0.718) [20] | ND | (0.718) [20] |
| Trichloroethene | 1400 | (2.74) [20] | 296 | (1.37) [10] | 30900 | (24.7) [500] | 8030 | (4.94) [100] | ND | (4.94) [100] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 6

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|---|----------|------|---|-----------|------|---|-----------|------|---|-----------|------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA065 AFP4-SPH-GW15-0 21-SEP-2000 | | | Bldg181 WJETA067 AFP4-SPH-GW16-0 21-SEP-2000 | | | Bldg181 WJETA058 AFP4-SPH-GW17-0 03-OCT-2000 | | | Bldg181 WJETA059 AFP4-SPH-GW18-0 03-OCT-2000 | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (2.12) | [20] | ND | (1.06) | [10] | ND | (1.33) | [20] | ND | (1.33) | [20] |
| Vinyl chloride | ND | (2.28) | [20] | ND | (1.14) | [10] | ND | (1.11) | [20] | ND | (1.11) | [20] |
| cis-1,2-Dichloroethene | ND | (2.24) | [20] | ND | (1.12) | [10] | ND | (0.874) | [20] | ND | (0.874) | [20] |
| cis-1,3-Dichloropropene | ND | (1.64) | [20] | ND | (0.818) | [10] | ND | (0.972) | [20] | ND | (0.972) | [20] |
| n-Butylbenzene | ND | (2.04) | [20] | ND | (1.02) | [10] | ND | (1.52) | [20] | ND | (1.52) | [20] |
| n-Propylbenzene | ND | (2.80) | [20] | ND | (1.40) | [10] | ND | (1.65) | [20] | ND | (1.65) | [20] |
| o-Xylene | ND | (1.69) | [20] | ND | (0.844) | [10] | ND | (0.722) | [20] | ND | (0.722) | [20] |
| p-Xylene/m-Xylene | ND | (3.34) | [20] | ND | (1.67) | [10] | ND | (1.72) | [20] | ND | (1.72) | [20] |
| sec-Butylbenzene | ND | (2.10) | [20] | ND | (1.05) | [10] | ND | (1.34) | [20] | ND | (1.34) | [20] |
| tert-Butylbenzene | ND | (1.82) | [20] | ND | (0.911) | [10] | ND | (0.532) | [20] | ND | (0.532) | [20] |
| trans-1,2-Dichloroethene | ND | (2.38) | [20] | ND | (1.19) | [10] | 1.16 | (1.81) | [20] | 1.30 | (1.81) | [20] |
| trans-1,3-Dichloropropene | ND | (1.82) | [20] | ND | (0.908) | [10] | ND | (1.59) | [20] | ND | (1.59) | [20] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 7

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|---|-----------|------|---|-----------|------|---|-----------|------|---|-----------|------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA060 AFP4-SPH-GW19-0 03-OCT-2000 | | | Bldg181 WJETA061 AFP4-SPH-GW20-0 03-OCT-2000 | | | Bldg181 WJETA062 AFP4-SPH-GW21-0 03-OCT-2000 | | | Bldg181 WJETA063 AFP4-SPH-GW22-0 03-OCT-2000 | | |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (1.66) | [20] | ND | (1.66) | [20] | ND | (1.66) | [20] | ND | (1.66) | [20] |
| 1,1,1-Trichloroethane | ND | (0.366) | [20] | ND | (0.366) | [20] | ND | (0.366) | [20] | ND | (0.366) | [20] |
| 1,1,2,2-Tetrachloroethane | ND | (1.55) | [20] | ND | (1.55) | [20] | ND | (1.55) | [20] | ND | (1.55) | [20] |
| 1,1,2-Trichloroethane | ND | (2.66) | [20] | ND | (2.66) | [20] | ND | (2.66) | [20] | ND | (2.66) | [20] |
| 1,1-Dichloroethane | ND | (0.832) | [20] | ND | (0.832) | [20] | ND | (0.832) | [20] | ND | (0.832) | [20] |
| 1,1-Dichloroethene | ND | (0.872) | [20] | ND | (0.872) | [20] | ND | (0.872) | [20] | ND | (0.872) | [20] |
| 1,1-Dichloropropene | ND | (1.13) | [20] | ND | (1.13) | [20] | ND | (1.13) | [20] | ND | (1.13) | [20] |
| 1,2,3-Trichlorobenzene | ND | (5.26) | [20] | ND | (5.26) | [20] | ND | (5.26) | [20] | ND | (5.26) | [20] |
| 1,2,3-Trichloropropane | ND | (1.69) | [20] | ND | (1.69) | [20] | ND | (1.69) | [20] | ND | (1.69) | [20] |
| 1,2,4-Trichlorobenzene | ND | (3.54) | [20] | ND | (3.54) | [20] | ND | (3.54) | [20] | ND | (3.54) | [20] |
| 1,2,4-Trimethylbenzene | ND | (0.956) | [20] | ND | (0.956) | [20] | ND | (0.956) | [20] | ND | (0.956) | [20] |
| 1,2-Dibromo-3-chloropropane | ND | (23.6) | [20] | ND | (23.6) | [20] | ND | (23.6) | [20] | ND | (23.6) | [20] |
| 1,2-Dibromoethane | ND | (1.43) | [20] | ND | (1.43) | [20] | ND | (1.43) | [20] | ND | (1.43) | [20] |
| 1,2-Dichlorobenzene | ND | (0.976) | [20] | ND | (0.976) | [20] | ND | (0.976) | [20] | ND | (0.976) | [20] |
| 1,2-Dichloroethane | ND | (1.24) | [20] | ND | (1.24) | [20] | ND | (1.24) | [20] | ND | (1.24) | [20] |
| 1,2-Dichloropropane | ND | (0.642) | [20] | ND | (0.642) | [20] | ND | (0.642) | [20] | ND | (0.642) | [20] |
| 1,3,5-Trimethylbenzene | ND | (0.786) | [20] | ND | (0.786) | [20] | ND | (0.786) | [20] | ND | (0.786) | [20] |
| 1,3-Dichlorobenzene | ND | (0.934) | [20] | ND | (0.934) | [20] | ND | (0.934) | [20] | ND | (0.934) | [20] |
| 1,3-Dichloropropane | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] |
| 1,4-Dichlorobenzene | ND | (0.986) | [20] | ND | (0.986) | [20] | ND | (0.986) | [20] | ND | (0.986) | [20] |
| 1-Chlorohexane | ND | (1.77) | [20] | ND | (1.77) | [20] | ND | (1.77) | [20] | ND | (1.77) | [20] |
| 2,2-Dichloropropane | ND | (1.34) | [20] | ND | (1.34) | [20] | ND | (1.34) | [20] | ND | (1.34) | [20] |
| 2-Chlorotoluene | ND | (1.38) | [20] | ND | (1.38) | [20] | ND | (1.38) | [20] | ND | (1.38) | [20] |
| 4-Chlorotoluene | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 8

| PARAMETER | SITE ID | | | LOCATION ID | | | SAMPLE ID | | | DATE SAMPLED | | |
|--|-----------------|-----------|-------|-----------------|-----------|-------|-----------------|-----------|-------|-----------------|-----------|------|
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | WJETA060 | | | WJETA061 | | | WJETA062 | | | WJETA063 | | |
| | AFP4-SPH-GW19-0 | | | AFP4-SPH-GW20-0 | | | AFP4-SPH-GW21-0 | | | AFP4-SPH-GW22-0 | | |
| | 03-OCT-2000 | | | 03-OCT-2000 | | | 03-OCT-2000 | | | 03-OCT-2000 | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (1.06) | [20] | ND | (1.06) | [20] | ND | (1.06) | [20] | ND | (1.06) | [20] |
| Benzene | ND | (0.706) | [20] | ND | (0.706) | [20] | ND | (0.706) | [20] | ND | (0.706) | [20] |
| Bromobenzene | ND | (1.60) | [20] | ND | (1.60) | [20] | ND | (1.60) | [20] | ND | (1.60) | [20] |
| Bromochloromethane | ND | (1.62) | [20] | ND | (1.62) | [20] | ND | (1.62) | [20] | ND | (1.62) | [20] |
| Bromodichloromethane | ND | (1.13) | [20] | ND | (1.13) | [20] | ND | (1.13) | [20] | ND | (1.13) | [20] |
| Bromoform | ND | (2.36) | [20] | ND | (2.36) | [20] | ND | (2.36) | [20] | ND | (2.36) | [20] |
| Bromomethane (Methylbromide) | ND | (1.69) | [20] | ND | (1.69) | [20] | ND | (1.69) | [20] | ND | (1.69) | [20] |
| Carbon tetrachloride | ND | (1.86) | [20] | ND | (1.86) | [20] | ND | (1.86) | [20] | ND | (1.86) | [20] |
| Chlorobenzene | ND | (0.516) | [20] | ND | (0.516) | [20] | ND | (0.516) | [20] | ND | (0.516) | [20] |
| Chloroethane | ND | (1.40) | [20] | ND | (1.40) | [20] | ND | (1.40) | [20] | ND | (1.40) | [20] |
| Chloroform | ND | (1.42) | [20] | ND | (1.42) | [20] | ND | (1.42) | [20] | ND | (1.42) | [20] |
| Chloromethane | ND | (2.60) | [20] | ND | (2.60) | [20] | ND | (2.60) | [20] | ND | (2.60) | [20] |
| Dibromochloromethane | ND | (0.938) | [20] | ND | (0.938) | [20] | ND | (0.938) | [20] | ND | (0.938) | [20] |
| Dibromomethane | ND | (2.28) | [20] | ND | (2.28) | [20] | ND | (2.28) | [20] | ND | (2.28) | [20] |
| Dichlorodifluoromethane | ND | (3.50) | [20] | ND | (3.50) | [20] | ND | (3.50) | [20] | ND | (3.50) | [20] |
| Ethylbenzene | ND | (1.08) | [20] | ND | (1.08) | [20] | ND | (1.08) | [20] | ND | (1.08) | [20] |
| Hexachloro-1,3-butadiene | ND | (7.38) | [20] | ND | (7.38) | [20] | ND | (7.38) | [20] | ND | (7.38) | [20] |
| Isopropylbenzene | ND | (0.722) | [20] | ND | (0.722) | [20] | ND | (0.722) | [20] | ND | (0.722) | [20] |
| Methylene chloride | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] |
| Naphthalene | ND | (2.24) | [20] | ND | (2.24) | [20] | ND | (2.24) | [20] | ND | (2.24) | [20] |
| Styrene | ND | (1.05) | [20] | ND | (1.05) | [20] | ND | (1.05) | [20] | ND | (1.05) | [20] |
| Tetrachloroethene | ND | (2.18) | [20] | ND | (2.18) | [20] | ND | (2.18) | [20] | ND | (2.18) | [20] |
| Toluene | ND | (0.718) | [20] | ND | (0.718) | [20] | ND | (0.718) | [20] | ND | (0.718) | [20] |
| Trichloroethene | 9490 | (4.94) | [100] | 10600 | (4.94) | [100] | 9360 | (4.94) | [100] | 1740 | (0.988) | [20] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 9

| PARAMETER | SITE ID | | | LOCATION ID | | | SAMPLE ID | | | DATE SAMPLED | | |
|--|-----------------|-----------|------|-----------------|-----------|------|-----------------|-----------|------|-----------------|-----------|------|
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | WJETA060 | | | WJETA061 | | | WJETA062 | | | WJETA063 | | |
| | AFP4-SPH-GW19-0 | | | AFP4-SPH-GW20-0 | | | AFP4-SPH-GW21-0 | | | AFP4-SPH-GW22-0 | | |
| | 03-OCT-2000 | | | 03-OCT-2000 | | | 03-OCT-2000 | | | 03-OCT-2000 | | |
| ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (1.33) | [20] | ND | (1.33) | [20] | ND | (1.33) | [20] | ND | (1.33) | [20] |
| Vinyl chloride | ND | (1.11) | [20] | ND | (1.11) | [20] | ND | (1.11) | [20] | ND | (1.11) | [20] |
| cis-1,2-Dichloroethene | ND | (0.874) | [20] | 1.98 | (0.874) | [20] | ND | (0.874) | [20] | ND | (0.874) | [20] |
| cis-1,3-Dichloropropene | ND | (0.972) | [20] | ND | (0.972) | [20] | ND | (0.972) | [20] | ND | (0.972) | [20] |
| n-Butylbenzene | ND | (1.52) | [20] | ND | (1.52) | [20] | ND | (1.52) | [20] | ND | (1.52) | [20] |
| n-Propylbenzene | ND | (1.65) | [20] | ND | (1.65) | [20] | ND | (1.65) | [20] | ND | (1.65) | [20] |
| o-Xylene | ND | (0.722) | [20] | ND | (0.722) | [20] | ND | (0.722) | [20] | ND | (0.722) | [20] |
| p-Xylene/m-Xylene | ND | (1.72) | [20] | ND | (1.72) | [20] | ND | (1.72) | [20] | ND | (1.72) | [20] |
| sec-Butylbenzene | ND | (1.34) | [20] | ND | (1.34) | [20] | ND | (1.34) | [20] | ND | (1.34) | [20] |
| tert-Butylbenzene | ND | (0.532) | [20] | ND | (0.532) | [20] | ND | (0.532) | [20] | ND | (0.532) | [20] |
| trans-1,2-Dichloroethene | ND | (1.81) | [20] | ND | (1.81) | [20] | ND | (1.81) | [20] | ND | (1.81) | [20] |
| trans-1,3-Dichloropropene | ND | (1.59) | [20] | ND | (1.59) | [20] | ND | (1.59) | [20] | ND | (1.59) | [20] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 10

| PARAMETER | Bldg181 WJETA064 AFP4-SPH-GW23-0 03-OCT-2000 | | | Bldg181 WJETA065 AFP4-SPH-GW24-0 03-OCT-2000 | | | Bldg181 WJETA066 AFP4-SPH-GW25-0 03-OCT-2000 | | | Bldg181 WJETA067 AFP4-SPH-GW26-0 03-OCT-2000 | | |
|---|---|-----------|------|---|-----------|------|---|-----------|------|---|-----------|------|
| | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (1.66) | [20] | ND | (1.66) | [20] | ND | (1.66) | [20] | ND | (1.66) | [20] |
| 1,1,1-Trichloroethane | ND | (0.366) | [20] | ND | (0.366) | [20] | ND | (0.366) | [20] | ND | (0.366) | [20] |
| 1,1,2,2-Tetrachloroethane | ND | (1.55) | [20] | ND | (1.55) | [20] | ND | (1.55) | [20] | ND | (1.55) | [20] |
| 1,1,2-Trichloroethane | ND | (2.66) | [20] | ND | (2.66) | [20] | ND | (2.66) | [20] | ND | (2.66) | [20] |
| 1,1-Dichloroethane | ND | (0.832) | [20] | ND | (0.832) | [20] | ND | (0.832) | [20] | ND | (0.832) | [20] |
| 1,1-Dichloroethene | ND | (0.872) | [20] | ND | (0.872) | [20] | ND | (0.872) | [20] | ND | (0.872) | [20] |
| 1,1-Dichloropropene | ND | (1.13) | [20] | ND | (1.13) | [20] | ND | (1.13) | [20] | ND | (1.13) | [20] |
| 1,2,3-Trichlorobenzene | ND | (5.26) | [20] | ND | (5.26) | [20] | ND | (5.26) | [20] | ND | (5.26) | [20] |
| 1,2,3-Trichloropropane | ND | (1.69) | [20] | ND | (1.69) | [20] | ND | (1.69) | [20] | ND | (1.69) | [20] |
| 1,2,4-Trichlorobenzene | ND | (3.54) | [20] | ND | (3.54) | [20] | ND | (3.54) | [20] | ND | (3.54) | [20] |
| 1,2,4-Trimethylbenzene | ND | (0.956) | [20] | ND | (0.956) | [20] | ND | (0.956) | [20] | ND | (0.956) | [20] |
| 1,2-Dibromo-3-chloropropane | ND | (23.6) | [20] | ND | (23.6) | [20] | ND | (23.6) | [20] | ND | (23.6) | [20] |
| 1,2-Dibromoethane | ND | (1.43) | [20] | ND | (1.43) | [20] | ND | (1.43) | [20] | ND | (1.43) | [20] |
| 1,2-Dichlorobenzene | ND | (0.976) | [20] | ND | (0.976) | [20] | ND | (0.976) | [20] | ND | (0.976) | [20] |
| 1,2-Dichloroethane | ND | (1.24) | [20] | ND | (1.24) | [20] | ND | (1.24) | [20] | ND | (1.24) | [20] |
| 1,2-Dichloropropane | ND | (0.642) | [20] | ND | (0.642) | [20] | ND | (0.642) | [20] | ND | (0.642) | [20] |
| 1,3,5-Trimethylbenzene | ND | (0.786) | [20] | ND | (0.786) | [20] | ND | (0.786) | [20] | ND | (0.786) | [20] |
| 1,3-Dichlorobenzene | ND | (0.934) | [20] | ND | (0.934) | [20] | ND | (0.934) | [20] | ND | (0.934) | [20] |
| 1,3-Dichloropropane | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] |
| 1,4-Dichlorobenzene | ND | (0.986) | [20] | ND | (0.986) | [20] | ND | (0.986) | [20] | ND | (0.986) | [20] |
| 1-Chlorohexane | ND | (1.77) | [20] | ND | (1.77) | [20] | ND | (1.77) | [20] | ND | (1.77) | [20] |
| 2,2-Dichloropropane | ND | (1.34) | [20] | ND | (1.34) | [20] | ND | (1.34) | [20] | ND | (1.34) | [20] |
| 2-Chlorotoluene | ND | (1.38) | [20] | ND | (1.38) | [20] | ND | (1.38) | [20] | ND | (1.38) | [20] |
| 4-Chlorotoluene | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] | ND | (1.58) | [20] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 11

| PARAMETER | SITE ID | | | | | | | | | | | | | | | |
|--|-----------------|---------|--------|------|-----------------|---------|------|---------|-----------------|-------|---------|---------|-----------------|--|--|--|
| | LOCATION ID | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | |
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | |
| | WJETA064 | | | | WJETA065 | | | | WJETA066 | | | | WJETA067 | | | |
| | AFP4-SPH-GW23-0 | | | | AFP4-SPH-GW24-0 | | | | AFP4-SPH-GW25-0 | | | | AFP4-SPH-GW26-0 | | | |
| | 03-OCT-2000 | | | | 03-OCT-2000 | | | | 03-OCT-2000 | | | | 03-OCT-2000 | | | |
| ----- | | | | | | | | | | | | | | | | |
| SW82608 - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (1.06 |) [20] | ND | (1.06 |) [20] | ND | (1.06 |) [20] | ND | (1.06 |) [20] | | | | |
| Benzene | ND | (0.706 |) [20] | ND | (0.706 |) [20] | ND | (0.706 |) [20] | ND | (0.706 |) [20] | | | | |
| Bromobenzene | ND | (1.60 |) [20] | ND | (1.60 |) [20] | ND | (1.60 |) [20] | ND | (1.60 |) [20] | | | | |
| Bromochloromethane | ND | (1.62 |) [20] | ND | (1.62 |) [20] | ND | (1.62 |) [20] | ND | (1.62 |) [20] | | | | |
| Bromodichloromethane | ND | (1.13 |) [20] | ND | (1.13 |) [20] | ND | (1.13 |) [20] | ND | (1.13 |) [20] | | | | |
| Bromoform | ND | (2.36 |) [20] | ND | (2.36 |) [20] | ND | (2.36 |) [20] | ND | (2.36 |) [20] | | | | |
| Bromomethane (Methylbromide) | ND | (1.69 |) [20] | ND | (1.69 |) [20] | ND | (1.69 |) [20] | ND | (1.69 |) [20] | | | | |
| Carbon tetrachloride | ND | (1.86 |) [20] | ND | (1.86 |) [20] | ND | (1.86 |) [20] | ND | (1.86 |) [20] | | | | |
| Chlorobenzene | ND | (0.516 |) [20] | ND | (0.516 |) [20] | ND | (0.516 |) [20] | ND | (0.516 |) [20] | | | | |
| Chloroethane | ND | (1.40 |) [20] | ND | (1.40 |) [20] | ND | (1.40 |) [20] | ND | (1.40 |) [20] | | | | |
| Chloroform | ND | (1.42 |) [20] | ND | (1.42 |) [20] | ND | (1.42 |) [20] | ND | (1.42 |) [20] | | | | |
| Chloromethane | ND | (2.60 |) [20] | ND | (2.60 |) [20] | ND | (2.60 |) [20] | ND | (2.60 |) [20] | | | | |
| Dibromochloromethane | ND | (0.938 |) [20] | ND | (0.938 |) [20] | ND | (0.938 |) [20] | ND | (0.938 |) [20] | | | | |
| Dibromomethane | ND | (2.28 |) [20] | ND | (2.28 |) [20] | ND | (2.28 |) [20] | ND | (2.28 |) [20] | | | | |
| Dichlorodifluoromethane | ND | (3.50 |) [20] | ND | (3.50 |) [20] | ND | (3.50 |) [20] | ND | (3.50 |) [20] | | | | |
| Ethylbenzene | ND | (1.08 |) [20] | ND | (1.08 |) [20] | ND | (1.08 |) [20] | ND | (1.08 |) [20] | | | | |
| Hexachloro-1,3-butadiene | ND | (7.38 |) [20] | ND | (7.38 |) [20] | ND | (7.38 |) [20] | ND | (7.38 |) [20] | | | | |
| Isopropylbenzene | ND | (0.722 |) [20] | ND | (0.722 |) [20] | ND | (0.722 |) [20] | ND | (0.722 |) [20] | | | | |
| Methylene chloride | ND | (1.58 |) [20] | ND | (1.58 |) [20] | ND | (1.58 |) [20] | ND | (1.58 |) [20] | | | | |
| Naphthalene | ND | (2.24 |) [20] | ND | (2.24 |) [20] | ND | (2.24 |) [20] | ND | (2.24 |) [20] | | | | |
| Styrene | ND | (1.05 |) [20] | ND | (1.05 |) [20] | ND | (1.05 |) [20] | ND | (1.05 |) [20] | | | | |
| Tetrachloroethene | ND | (2.18 |) [20] | ND | (2.18 |) [20] | ND | (2.18 |) [20] | 8.30 | (2.18 |) [20] | | | | |
| Toluene | ND | (0.718 |) [20] | ND | (0.718 |) [20] | ND | (0.718 |) [20] | ND | (0.718 |) [20] | | | | |
| Trichloroethene | 677 | (0.988 |) [20] | 4120 | (4.94 |) [100] | 6190 | (4.94 |) [100] | 32700 | (24.7 |) [500] | | | | |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 12

| | SITE ID | | | | | | | | | | | | | | | |
|--|-----------------|---------|--------|----|-----------------|--------|------|---------|-----------------|------|---------|--------|-----------------|--|--|--|
| | LOCATION ID | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | |
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | |
| | WJETA064 | | | | WJETA065 | | | | WJETA066 | | | | WJETA067 | | | |
| | AFP4-SPH-GW23-0 | | | | AFP4-SPH-GW24-0 | | | | AFP4-SPH-GW25-0 | | | | AFP4-SPH-GW26-0 | | | |
| | 03-OCT-2000 | | | | 03-OCT-2000 | | | | 03-OCT-2000 | | | | 03-OCT-2000 | | | |
| PARAMETER | | | | | | | | | | | | | | | | |
| ----- | | | | | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (1.33 |) [20] | ND | (1.33 |) [20] | ND | (1.33 |) [20] | ND | (1.33 |) [20] | | | | |
| Vinyl chloride | ND | (1.11 |) [20] | ND | (1.11 |) [20] | ND | (1.11 |) [20] | ND | (1.11 |) [20] | | | | |
| cis-1,2-Dichloroethene | ND | (0.874 |) [20] | ND | (0.874 |) [20] | 1.22 | (0.874 |) [20] | 2.61 | (0.874 |) [20] | | | | |
| cis-1,3-Dichloropropene | ND | (0.972 |) [20] | ND | (0.972 |) [20] | ND | (0.972 |) [20] | ND | (0.972 |) [20] | | | | |
| n-Butylbenzene | ND | (1.52 |) [20] | ND | (1.52 |) [20] | ND | (1.52 |) [20] | ND | (1.52 |) [20] | | | | |
| n-Propylbenzene | ND | (1.65 |) [20] | ND | (1.65 |) [20] | ND | (1.65 |) [20] | ND | (1.65 |) [20] | | | | |
| o-Xylene | ND | (0.722 |) [20] | ND | (0.722 |) [20] | ND | (0.722 |) [20] | ND | (0.722 |) [20] | | | | |
| p-Xylene/m-Xylene | ND | (1.72 |) [20] | ND | (1.72 |) [20] | ND | (1.72 |) [20] | ND | (1.72 |) [20] | | | | |
| sec-Butylbenzene | ND | (1.34 |) [20] | ND | (1.34 |) [20] | ND | (1.34 |) [20] | ND | (1.34 |) [20] | | | | |
| tert-Butylbenzene | ND | (0.532 |) [20] | ND | (0.532 |) [20] | ND | (0.532 |) [20] | ND | (0.532 |) [20] | | | | |
| trans-1,2-Dichloroethene | ND | (1.81 |) [20] | ND | (1.81 |) [20] | ND | (1.81 |) [20] | ND | (1.81 |) [20] | | | | |
| trans-1,3-Dichloropropene | ND | (1.59 |) [20] | ND | (1.59 |) [20] | ND | (1.59 |) [20] | ND | (1.59 |) [20] | | | | |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 13

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|---|-----------|------|---|----------|------|---|------------|-----|---|----------|------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA067 AFP4-SPH-GW26-1 Dup of AFP4-SPH-GW26-0 03-OCT-2000 | | | Bldg181 WJETA064 AFP4-SPH-GW27-0 19-OCT-2000 | | | Bldg181 WJETA063 AFP4-SPH-GW28-0 19-OCT-2000 | | | Bldg181 WJETA065 AFP4-SPH-GW29-0 19-OCT-2000 | | |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (1.66) | [20] | ND | (2.22) | [20] | ND | (0.111) | [1] | ND | (2.22) | [20] |
| 1,1,1-Trichloroethane | ND | (0.366) | [20] | ND | (3.38) | [20] | ND | (0.169) | [1] | ND | (3.38) | [20] |
| 1,1,2,2-Tetrachloroethane | ND | (1.55) | [20] | ND | (1.74) | [20] | ND | (0.0870) | [1] | ND | (1.74) | [20] |
| 1,1,2-Trichloroethane | ND | (2.66) | [20] | ND | (1.64) | [20] | ND | (0.0821) | [1] | ND | (1.64) | [20] |
| 1,1-Dichloroethane | ND | (0.832) | [20] | ND | (2.48) | [20] | ND | (0.124) | [1] | ND | (2.48) | [20] |
| 1,1-Dichloroethene | ND | (0.872) | [20] | ND | (2.44) | [20] | ND | (0.122) | [1] | ND | (2.44) | [20] |
| 1,1-Dichloropropene | ND | (1.13) | [20] | ND | (1.99) | [20] | ND | (0.0994) | [1] | ND | (1.99) | [20] |
| 1,2,3-Trichlorobenzene | ND | (5.26) | [20] | ND | (11.0) | [20] | ND | (0.551) | [1] | ND | (11.0) | [20] |
| 1,2,3-Trichloropropane | ND | (1.69) | [20] | ND | (5.76) | [20] | ND | (0.288) | [1] | ND | (5.76) | [20] |
| 1,2,4-Trichlorobenzene | ND | (3.54) | [20] | ND | (2.70) | [20] | ND | (0.135) | [1] | ND | (2.70) | [20] |
| 1,2,4-Trimethylbenzene | ND | (0.956) | [20] | ND | (2.48) | [20] | ND | (0.124) | [1] | ND | (2.48) | [20] |
| 1,2-Dibromo-3-chloropropane | ND | (23.6) | [20] | ND | (11.0) | [20] | ND | (0.548) | [1] | ND | (11.0) | [20] |
| 1,2-Dibromoethane | ND | (1.43) | [20] | ND | (2.74) | [20] | ND | (0.137) | [1] | ND | (2.74) | [20] |
| 1,2-Dichlorobenzene | ND | (0.976) | [20] | ND | (1.93) | [20] | ND | (0.0965) | [1] | ND | (1.93) | [20] |
| 1,2-Dichloroethane | ND | (1.24) | [20] | ND | (2.04) | [20] | ND | (0.102) | [1] | ND | (2.04) | [20] |
| 1,2-Dichloropropane | ND | (0.642) | [20] | ND | (1.74) | [20] | ND | (0.0869) | [1] | ND | (1.74) | [20] |
| 1,3,5-Trimethylbenzene | ND | (0.786) | [20] | ND | (1.81) | [20] | ND | (0.0905) | [1] | ND | (1.81) | [20] |
| 1,3-Dichlorobenzene | ND | (0.934) | [20] | ND | (1.69) | [20] | ND | (0.0846) | [1] | ND | (1.69) | [20] |
| 1,3-Dichloropropane | ND | (1.58) | [20] | ND | (2.70) | [20] | ND | (0.135) | [1] | ND | (2.70) | [20] |
| 1,4-Dichlorobenzene | ND | (0.986) | [20] | ND | (3.00) | [20] | ND | (0.150) | [1] | ND | (3.00) | [20] |
| 1-Chlorohexane | ND | (1.77) | [20] | ND | (1.88) | [20] | ND | (0.0938) | [1] | ND | (1.88) | [20] |
| 2,2-Dichloropropane | ND | (1.34) | [20] | ND | (3.20) | [20] | ND | (0.160) | [1] | ND | (3.20) | [20] |
| 2-Chlorotoluene | ND | (1.38) | [20] | ND | (3.56) | [20] | ND | (0.178) | [1] | ND | (3.56) | [20] |
| 4-Chlorotoluene | ND | (1.58) | [20] | ND | (1.95) | [20] | ND | (0.0974) | [1] | ND | (1.95) | [20] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 14

| PARAMETER ----- | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED | | | | | | | | | | | |
|--|--|-----------|-------|--------------------------------|----------|------|--------------------------------|------------|-----|--------------------------------|----------|------|
| | Bldg181 WJETA067 | | | Bldg181 WJETA064 | | | Bldg181 WJETA063 | | | Bldg181 WJETA065 | | |
| | AFP4-SPH-GW26-1 Dup of AFP4-SPH-GW26-0 03-OCT-2000 | | | AFP4-SPH-GW27-0 19-OCT-2000 | | | AFP4-SPH-GW28-0 19-OCT-2000 | | | AFP4-SPH-GW29-0 19-OCT-2000 | | |
| | ----- | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (1.06) | [20] | ND | (2.30) | [20] | ND | (0.115) | [1] | ND | (2.30) | [20] |
| Benzene | ND | (0.706) | [20] | ND | (1.28) | [20] | ND | (0.0641) | [1] | ND | (1.28) | [20] |
| Bromobenzene | ND | (1.60) | [20] | ND | (2.00) | [20] | ND | (0.0998) | [1] | ND | (2.00) | [20] |
| Bromochloromethane | ND | (1.62) | [20] | ND | (2.62) | [20] | ND | (0.131) | [1] | ND | (2.62) | [20] |
| Bromodichloromethane | ND | (1.13) | [20] | ND | (2.36) | [20] | 0.966 | (0.118) | [1] | ND | (2.36) | [20] |
| Bromoform | ND | (2.36) | [20] | ND | (3.40) | [20] | ND | (0.170) | [1] | ND | (3.40) | [20] |
| Bromomethane (Methylbromide) | ND | (1.69) | [20] | ND | (3.98) | [20] | ND | (0.199) | [1] | ND | (3.98) | [20] |
| Carbon tetrachloride | ND | (1.86) | [20] | ND | (1.30) | [20] | ND | (0.0652) | [1] | ND | (1.30) | [20] |
| Chlorobenzene | ND | (0.516) | [20] | ND | (1.68) | [20] | ND | (0.0842) | [1] | ND | (1.68) | [20] |
| Chloroethane | ND | (1.40) | [20] | ND | (1.85) | [20] | ND | (0.0925) | [1] | ND | (1.85) | [20] |
| Chloroform | ND | (1.42) | [20] | ND | (1.79) | [20] | 2.87 | (0.0896) | [1] | ND | (1.79) | [20] |
| Chloromethane | ND | (2.60) | [20] | ND | (2.54) | [20] | ND | (0.127) | [1] | ND | (2.54) | [20] |
| Dibromochloromethane | ND | (0.938) | [20] | ND | (2.80) | [20] | ND | (0.140) | [1] | ND | (2.80) | [20] |
| Dibromomethane | ND | (2.28) | [20] | ND | (2.96) | [20] | ND | (0.148) | [1] | ND | (2.96) | [20] |
| Dichlorodifluoromethane | ND | (3.50) | [20] | ND | (4.74) | [20] | ND | (0.237) | [1] | ND | (4.74) | [20] |
| Ethylbenzene | ND | (1.08) | [20] | ND | (2.72) | [20] | ND | (0.136) | [1] | ND | (2.72) | [20] |
| Hexachloro-1,3-butadiene | ND | (7.38) | [20] | ND | (6.62) | [20] | ND | (0.331) | [1] | ND | (6.62) | [20] |
| Isopropylbenzene | ND | (0.722) | [20] | ND | (1.86) | [20] | ND | (0.0931) | [1] | ND | (1.86) | [20] |
| Methylene chloride | ND | (1.58) | [20] | ND | (2.52) | [20] | ND | (0.126) | [1] | ND | (2.52) | [20] |
| Naphthalene | ND | (2.24) | [20] | ND | (1.60) | [20] | ND | (0.0801) | [1] | ND | (1.60) | [20] |
| Styrene | ND | (1.05) | [20] | ND | (1.95) | [20] | ND | (0.0977) | [1] | ND | (1.95) | [20] |
| Tetrachloroethene | 4.90 | (2.18) | [20] | ND | (2.88) | [20] | ND | (0.144) | [1] | ND | (2.88) | [20] |
| Toluene | ND | (0.718) | [20] | ND | (1.27) | [20] | ND | (0.0637) | [1] | ND | (1.27) | [20] |
| Trichloroethene | 17500 | (24.7) | [500] | 425 | (2.74) | [20] | 10.3 | (0.137) | [1] | 1060 | (2.74) | [20] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

| PARAMETER | SITE ID | | | | | | | | | | | | | | | | |
|--|---|-----------|------|----|---|------|----|------------|---|----|----------|------|---|--|--|--|--|
| | LOCATION ID | | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | | |
| | Bldg181 WJETA067 AFP4-SPH-GW26-1 Dup of AFP4-SPH-GW26-0 03-OCT-2000 | | | | Bldg181 WJETA064 AFP4-SPH-GW27-0 19-OCT-2000 | | | | Bldg181 WJETA063 AFP4-SPH-GW28-0 19-OCT-2000 | | | | Bldg181 WJETA065 AFP4-SPH-GW29-0 19-OCT-2000 | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (1.33) | [20] | ND | (2.12) | [20] | ND | (0.106) | [1] | ND | (2.12) | [20] | | | | | |
| Vinyl chloride | ND | (1.11) | [20] | ND | (2.28) | [20] | ND | (0.114) | [1] | ND | (2.28) | [20] | | | | | |
| cis-1,2-Dichloroethene | 1.40 | (0.874) | [20] | ND | (2.24) | [20] | ND | (0.112) | [1] | ND | (2.24) | [20] | | | | | |
| cis-1,3-Dichloropropene | ND | (0.972) | [20] | ND | (1.64) | [20] | ND | (0.0818) | [1] | ND | (1.64) | [20] | | | | | |
| n-Butylbenzene | ND | (1.52) | [20] | ND | (2.04) | [20] | ND | (0.102) | [1] | ND | (2.04) | [20] | | | | | |
| n-Propylbenzene | ND | (1.65) | [20] | ND | (2.80) | [20] | ND | (0.140) | [1] | ND | (2.80) | [20] | | | | | |
| o-Xylene | ND | (0.722) | [20] | ND | (1.69) | [20] | ND | (0.0844) | [1] | ND | (1.69) | [20] | | | | | |
| p-Xylene/m-Xylene | ND | (1.72) | [20] | ND | (3.34) | [20] | ND | (0.167) | [1] | ND | (3.34) | [20] | | | | | |
| sec-Butylbenzene | ND | (1.34) | [20] | ND | (2.10) | [20] | ND | (0.105) | [1] | ND | (2.10) | [20] | | | | | |
| tert-Butylbenzene | ND | (0.532) | [20] | ND | (1.82) | [20] | ND | (0.0911) | [1] | ND | (1.82) | [20] | | | | | |
| trans-1,2-Dichloroethene | ND | (1.81) | [20] | ND | (2.38) | [20] | ND | (0.119) | [1] | ND | (2.38) | [20] | | | | | |
| trans-1,3-Dichloropropene | ND | (1.59) | [20] | ND | (1.82) | [20] | ND | (0.0908) | [1] | ND | (1.82) | [20] | | | | | |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 16

| PARAMETER | SITE ID | | | | LOCATION ID | | | | SAMPLE ID | | | | DATE SAMPLED | | | |
|---|-----------------|----------|------|----|-----------------|-------|----|-----------|-----------------|----|----------|-------|-----------------|-----------|-------|----|
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | |
| | WJETA066 | | | | WJETA059 | | | | WJETA062 | | | | WJETA060 | | | |
| | AFP4-SPH-GW30-0 | | | | AFP4-SPH-GW31-0 | | | | AFP4-SPH-GW32-0 | | | | AFP4-SPH-GW33-0 | | | |
| | 19-OCT-2000 | | | | 19-OCT-2000 | | | | 19-OCT-2000 | | | | 19-OCT-2000 | | | |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (5.55) | [50] | ND | (22.2) | [200] | ND | (1.11) | [10] | ND | (22.2) | [200] | ND | (33.8) | [200] | ND |
| 1,1,1-Trichloroethane | ND | (8.45) | [50] | ND | (33.8) | [200] | ND | (1.69) | [10] | ND | (33.8) | [200] | ND | (17.4) | [200] | ND |
| 1,1,2,2-Tetrachloroethane | ND | (4.35) | [50] | ND | (17.4) | [200] | ND | (0.870) | [10] | ND | (17.4) | [200] | ND | (16.4) | [200] | ND |
| 1,1,2-Trichloroethane | ND | (4.10) | [50] | ND | (16.4) | [200] | ND | (0.821) | [10] | ND | (16.4) | [200] | ND | (24.8) | [200] | ND |
| 1,1-Dichloroethane | ND | (6.20) | [50] | ND | (24.8) | [200] | ND | (1.24) | [10] | ND | (24.8) | [200] | ND | (24.4) | [200] | ND |
| 1,1-Dichloroethene | ND | (6.10) | [50] | ND | (24.4) | [200] | ND | (1.22) | [10] | ND | (24.4) | [200] | ND | (110) | [200] | ND |
| 1,1-Dichloropropene | ND | (4.97) | [50] | ND | (19.9) | [200] | ND | (0.994) | [10] | ND | (19.9) | [200] | ND | (57.6) | [200] | ND |
| 1,2,3-Trichlorobenzene | ND | (27.6) | [50] | ND | (110) | [200] | ND | (5.51) | [10] | ND | (110) | [200] | ND | (27.0) | [200] | ND |
| 1,2,3-Trichloropropane | ND | (14.4) | [50] | ND | (57.6) | [200] | ND | (2.88) | [10] | ND | (57.6) | [200] | ND | (24.8) | [200] | ND |
| 1,2,4-Trichlorobenzene | ND | (6.75) | [50] | ND | (27.0) | [200] | ND | (1.35) | [10] | ND | (27.0) | [200] | ND | (110) | [200] | ND |
| 1,2,4-Trimethylbenzene | ND | (6.20) | [50] | ND | (24.8) | [200] | ND | (1.24) | [10] | ND | (24.8) | [200] | ND | (19.3) | [200] | ND |
| 1,2-Dibromo-3-chloropropane | ND | (27.4) | [50] | ND | (110) | [200] | ND | (5.48) | [10] | ND | (110) | [200] | ND | (20.4) | [200] | ND |
| 1,2-Dibromoethane | ND | (6.85) | [50] | ND | (27.4) | [200] | ND | (1.37) | [10] | ND | (27.4) | [200] | ND | (17.4) | [200] | ND |
| 1,2-Dichlorobenzene | ND | (4.82) | [50] | ND | (19.3) | [200] | ND | (0.965) | [10] | ND | (19.3) | [200] | ND | (16.9) | [200] | ND |
| 1,2-Dichloroethane | ND | (5.10) | [50] | ND | (20.4) | [200] | ND | (1.02) | [10] | ND | (20.4) | [200] | ND | (30.0) | [200] | ND |
| 1,2-Dichloropropane | ND | (4.34) | [50] | ND | (17.4) | [200] | ND | (0.869) | [10] | ND | (17.4) | [200] | ND | (18.8) | [200] | ND |
| 1,3,5-Trimethylbenzene | ND | (4.52) | [50] | ND | (18.1) | [200] | ND | (0.905) | [10] | ND | (18.1) | [200] | ND | (32.0) | [200] | ND |
| 1,3-Dichlorobenzene | ND | (4.23) | [50] | ND | (16.9) | [200] | ND | (0.846) | [10] | ND | (16.9) | [200] | ND | (35.6) | [200] | ND |
| 1,3-Dichloropropane | ND | (6.75) | [50] | ND | (27.0) | [200] | ND | (1.35) | [10] | ND | (27.0) | [200] | ND | (19.5) | [200] | ND |
| 1,4-Dichlorobenzene | ND | (7.50) | [50] | ND | (30.0) | [200] | ND | (1.50) | [10] | ND | (30.0) | [200] | ND | (0.974) | [10] | ND |
| 1-Chlorohexane | ND | (4.69) | [50] | ND | (18.8) | [200] | ND | (0.938) | [10] | ND | (18.8) | [200] | ND | | | |
| 2,2-Dichloropropane | ND | (8.00) | [50] | ND | (32.0) | [200] | ND | (1.60) | [10] | ND | (32.0) | [200] | ND | | | |
| 2-Chlorotoluene | ND | (8.90) | [50] | ND | (35.6) | [200] | ND | (1.78) | [10] | ND | (35.6) | [200] | ND | | | |
| 4-Chlorotoluene | ND | (4.87) | [50] | ND | (19.5) | [200] | ND | (0.974) | [10] | ND | (19.5) | [200] | ND | | | |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 17

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|-----------------|--------|--------|-----------------|--------|---------|-----------------|---------|--------|-----------------|--------|---------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | WJETA066 | | | WJETA059 | | | WJETA062 | | | WJETA060 | | |
| | AFP4-SPH-GW30-0 | | | AFP4-SPH-GW31-0 | | | AFP4-SPH-GW32-0 | | | AFP4-SPH-GW33-0 | | |
| | 19-OCT-2000 | | | 19-OCT-2000 | | | 19-OCT-2000 | | | 19-OCT-2000 | | |
| ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (5.75 |) [50] | ND | (23.0 |) [200] | ND | (1.15 |) [10] | ND | (23.0 |) [200] |
| Benzene | ND | (3.20 |) [50] | ND | (12.8 |) [200] | ND | (0.641 |) [10] | ND | (12.8 |) [200] |
| Bromobenzene | ND | (4.99 |) [50] | ND | (20.0 |) [200] | ND | (0.998 |) [10] | ND | (20.0 |) [200] |
| Bromochloromethane | ND | (6.55 |) [50] | ND | (26.2 |) [200] | ND | (1.31 |) [10] | ND | (26.2 |) [200] |
| Bromodichloromethane | ND | (5.90 |) [50] | ND | (23.6 |) [200] | ND | (1.18 |) [10] | ND | (23.6 |) [200] |
| Bromoform | ND | (8.50 |) [50] | ND | (34.0 |) [200] | ND | (1.70 |) [10] | ND | (34.0 |) [200] |
| Bromomethane (Methylbromide) | ND | (9.95 |) [50] | ND | (39.8 |) [200] | ND | (1.99 |) [10] | ND | (39.8 |) [200] |
| Carbon tetrachloride | ND | (3.26 |) [50] | ND | (13.0 |) [200] | ND | (0.652 |) [10] | ND | (13.0 |) [200] |
| Chlorobenzene | ND | (4.21 |) [50] | ND | (16.8 |) [200] | ND | (0.842 |) [10] | ND | (16.8 |) [200] |
| Chloroethane | ND | (4.62 |) [50] | ND | (18.5 |) [200] | ND | (0.925 |) [10] | ND | (18.5 |) [200] |
| Chloroform | ND | (4.48 |) [50] | ND | (17.9 |) [200] | ND | (0.896 |) [10] | ND | (17.9 |) [200] |
| Chloromethane | ND | (6.35 |) [50] | ND | (25.4 |) [200] | ND | (1.27 |) [10] | ND | (25.4 |) [200] |
| Dibromochloromethane | ND | (7.00 |) [50] | ND | (28.0 |) [200] | ND | (1.40 |) [10] | ND | (28.0 |) [200] |
| Dibromomethane | ND | (7.40 |) [50] | ND | (29.6 |) [200] | ND | (1.48 |) [10] | ND | (29.6 |) [200] |
| Dichlorodifluoromethane | ND | (11.8 |) [50] | ND | (47.4 |) [200] | ND | (2.37 |) [10] | ND | (47.4 |) [200] |
| Ethylbenzene | ND | (6.80 |) [50] | ND | (27.2 |) [200] | ND | (1.36 |) [10] | ND | (27.2 |) [200] |
| Hexachloro-1,3-butadiene | ND | (16.6 |) [50] | ND | (66.2 |) [200] | ND | (3.31 |) [10] | ND | (66.2 |) [200] |
| Isopropylbenzene | ND | (4.66 |) [50] | ND | (18.6 |) [200] | ND | (0.931 |) [10] | ND | (18.6 |) [200] |
| Methylene chloride | 17.9 | (6.30 |) [50] | ND | (25.2 |) [200] | ND | (1.26 |) [10] | ND | (25.2 |) [200] |
| Naphthalene | ND | (4.00 |) [50] | ND | (16.0 |) [200] | ND | (0.801 |) [10] | ND | (16.0 |) [200] |
| Styrene | ND | (4.88 |) [50] | ND | (19.5 |) [200] | ND | (0.977 |) [10] | ND | (19.5 |) [200] |
| Tetrachloroethene | ND | (7.20 |) [50] | ND | (28.8 |) [200] | ND | (1.44 |) [10] | ND | (28.8 |) [200] |
| Toluene | ND | (3.18 |) [50] | ND | (12.7 |) [200] | ND | (0.637 |) [10] | ND | (12.7 |) [200] |
| Trichloroethene | 3220 | (6.85 |) [50] | 6780 | (27.4 |) [200] | 206 | (1.37 |) [10] | 5870 | (27.4 |) [200] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 18

| PARAMETER | SITE ID | | | | | | | | | | | | | | | | | | | |
|--|-----------------|---|------|---|-----------------|----|---|------|-----------------|-------|----|---|-----------------|---|------|----|---|------|---|-------|
| | LOCATION ID | | | | | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | | | | | |
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | | | | |
| | WJETA066 | | | | WJETA059 | | | | WJETA062 | | | | WJETA060 | | | | | | | |
| | AFP4-SPH-GW30-0 | | | | AFP4-SPH-GW31-0 | | | | AFP4-SPH-GW32-0 | | | | AFP4-SPH-GW33-0 | | | | | | | |
| | 19-OCT-2000 | | | | 19-OCT-2000 | | | | 19-OCT-2000 | | | | 19-OCT-2000 | | | | | | | |
| ----- | | | | | | | | | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (| 5.30 |) | [50] | ND | (| 21.2 |) | [200] | ND | (| 1.06 |) | [10] | ND | (| 21.2 |) | [200] |
| Vinyl chloride | ND | (| 5.70 |) | [50] | ND | (| 22.8 |) | [200] | ND | (| 1.14 |) | [10] | ND | (| 22.8 |) | [200] |
| cis-1,2-Dichloroethene | ND | (| 5.60 |) | [50] | ND | (| 22.4 |) | [200] | ND | (| 1.12 |) | [10] | ND | (| 22.4 |) | [200] |
| cis-1,3-Dichloropropene | ND | (| 4.09 |) | [50] | ND | (| 16.4 |) | [200] | ND | (| 0.818 |) | [10] | ND | (| 16.4 |) | [200] |
| n-Butylbenzene | ND | (| 5.10 |) | [50] | ND | (| 20.4 |) | [200] | ND | (| 1.02 |) | [10] | ND | (| 20.4 |) | [200] |
| n-Propylbenzene | ND | (| 7.00 |) | [50] | ND | (| 28.0 |) | [200] | ND | (| 1.40 |) | [10] | ND | (| 28.0 |) | [200] |
| o-Xylene | ND | (| 4.22 |) | [50] | ND | (| 16.9 |) | [200] | ND | (| 0.844 |) | [10] | ND | (| 16.9 |) | [200] |
| p-Xylene/m-Xylene | ND | (| 8.35 |) | [50] | ND | (| 33.4 |) | [200] | ND | (| 1.67 |) | [10] | ND | (| 33.4 |) | [200] |
| sec-Butylbenzene | ND | (| 5.25 |) | [50] | ND | (| 21.0 |) | [200] | ND | (| 1.05 |) | [10] | ND | (| 21.0 |) | [200] |
| tert-Butylbenzene | ND | (| 4.56 |) | [50] | ND | (| 18.2 |) | [200] | ND | (| 0.911 |) | [10] | ND | (| 18.2 |) | [200] |
| trans-1,2-Dichloroethene | ND | (| 5.95 |) | [50] | ND | (| 23.8 |) | [200] | ND | (| 1.19 |) | [10] | ND | (| 23.8 |) | [200] |
| trans-1,3-Dichloropropene | ND | (| 4.54 |) | [50] | ND | (| 18.2 |) | [200] | ND | (| 0.908 |) | [10] | ND | (| 18.2 |) | [200] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 19

| PARAMETER | SITE ID | | | | | | | | | | | |
|------------------------------------|--|----------|-------|--|----------|------|--|-----------|------|--|-----------|------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA061 AFP4-SPH-GW34-0 | | | Bldg181 WJETA067 AFP4-SPH-GW35-0 | | | Bldg181 WJETA058 AFP4-SPH-GW36-0 | | | Bldg181 WJETA058 AFP4-SPH-GW36-1 Dup of AFP4-SPH-GW36-0 | | |
| | 19-OCT-2000 | | | 19-OCT-2000 | | | 19-OCT-2000 | | | 19-OCT-2000 | | |
| ----- | ----- | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons | (ug/L) | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (11.1) | [100] | ND | (2.22) | [20] | ND | (1.11) | [10] | ND | (1.11) | [10] |
| 1,1,1-Trichloroethane | ND | (16.9) | [100] | ND | (3.38) | [20] | ND | (1.69) | [10] | ND | (1.69) | [10] |
| 1,1,2,2-Tetrachloroethane | ND | (8.70) | [100] | ND | (1.74) | [20] | ND | (0.870) | [10] | ND | (0.870) | [10] |
| 1,1,2-Trichloroethane | ND | (8.21) | [100] | ND | (1.64) | [20] | ND | (0.821) | [10] | ND | (0.821) | [10] |
| 1,1-Dichloroethane | ND | (12.4) | [100] | ND | (2.48) | [20] | ND | (1.24) | [10] | ND | (1.24) | [10] |
| 1,1-Dichloroethene | ND | (12.2) | [100] | ND | (2.44) | [20] | ND | (1.22) | [10] | ND | (1.22) | [10] |
| 1,1-Dichloropropene | ND | (9.94) | [100] | ND | (1.99) | [20] | ND | (0.994) | [10] | ND | (0.994) | [10] |
| 1,2,3-Trichlorobenzene | ND | (55.1) | [100] | ND | (11.0) | [20] | ND | (5.51) | [10] | ND | (5.51) | [10] |
| 1,2,3-Trichloropropane | ND | (28.8) | [100] | ND | (5.76) | [20] | ND | (2.88) | [10] | ND | (2.88) | [10] |
| 1,2,4-Trichlorobenzene | ND | (13.5) | [100] | ND | (2.70) | [20] | ND | (1.35) | [10] | ND | (1.35) | [10] |
| 1,2,4-Trimethylbenzene | ND | (12.4) | [100] | ND | (2.48) | [20] | ND | (1.24) | [10] | ND | (1.24) | [10] |
| 1,2-Dibromo-3-chloropropane | ND | (54.8) | [100] | ND | (11.0) | [20] | ND | (5.48) | [10] | ND | (5.48) | [10] |
| 1,2-Dibromoethane | ND | (13.7) | [100] | ND | (2.74) | [20] | ND | (1.37) | [10] | ND | (1.37) | [10] |
| 1,2-Dichlorobenzene | ND | (9.65) | [100] | ND | (1.93) | [20] | ND | (0.965) | [10] | ND | (0.965) | [10] |
| 1,2-Dichloroethane | ND | (10.2) | [100] | ND | (2.04) | [20] | ND | (1.02) | [10] | ND | (1.02) | [10] |
| 1,2-Dichloropropane | ND | (8.69) | [100] | ND | (1.74) | [20] | ND | (0.869) | [10] | ND | (0.869) | [10] |
| 1,3,5-Trimethylbenzene | ND | (9.05) | [100] | ND | (1.81) | [20] | ND | (0.905) | [10] | ND | (0.905) | [10] |
| 1,3-Dichlorobenzene | ND | (8.46) | [100] | ND | (1.69) | [20] | ND | (0.846) | [10] | ND | (0.846) | [10] |
| 1,3-Dichloropropane | ND | (13.5) | [100] | ND | (2.70) | [20] | ND | (1.35) | [10] | ND | (1.35) | [10] |
| 1,4-Dichlorobenzene | ND | (15.0) | [100] | ND | (3.00) | [20] | ND | (1.50) | [10] | ND | (1.50) | [10] |
| 1-Chlorohexane | ND | (9.38) | [100] | ND | (1.88) | [20] | ND | (0.938) | [10] | ND | (0.938) | [10] |
| 2,2-Dichloropropane | ND | (16.0) | [100] | ND | (3.20) | [20] | ND | (1.60) | [10] | ND | (1.60) | [10] |
| 2-Chlorotoluene | ND | (17.8) | [100] | ND | (3.56) | [20] | ND | (1.78) | [10] | ND | (1.78) | [10] |
| 4-Chlorotoluene | ND | (9.74) | [100] | ND | (1.95) | [20] | ND | (0.974) | [10] | ND | (0.974) | [10] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 20

| | SITE ID | | | | | | | | | | | |
|--|--|----------|-------|--|------------|------|--|-----------|------|--|-----------|------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA061 AFP4-SPH-GW34-0 | | | Bldg181 WJETA067 AFP4-SPH-GW35-0 | | | Bldg181 WJETA058 AFP4-SPH-GW36-0 | | | Bldg181 WJETA058 AFP4-SPH-GW36-1 Dup of AFP4-SPH-GW36-0 | | |
| | 19-OCT-2000 | | | 19-OCT-2000 | | | 19-OCT-2000 | | | 19-OCT-2000 | | |
| PARAMETER | | | | | | | | | | | | |
| ----- | ----- | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (11.5) | [100] | ND | (2.30) | [20] | ND | (1.15) | [10] | ND | (1.15) | [10] |
| Benzene | ND | (6.41) | [100] | ND | (1.28) | [20] | ND | (0.641) | [10] | ND | (0.641) | [10] |
| Bromobenzene | ND | (9.98) | [100] | ND | (2.00) | [20] | ND | (0.998) | [10] | ND | (0.998) | [10] |
| Bromochloromethane | ND | (13.1) | [100] | ND | (2.62) | [20] | ND | (1.31) | [10] | ND | (1.31) | [10] |
| Bromodichloromethane | ND | (11.8) | [100] | ND | (2.36) | [20] | ND | (1.18) | [10] | ND | (1.18) | [10] |
| Bromoform | ND | (17.0) | [100] | ND | (3.40) | [20] | ND | (1.70) | [10] | ND | (1.70) | [10] |
| Bromomethane (Methylbromide) | ND | (19.9) | [100] | ND | (3.98) | [20] | ND | (1.99) | [10] | ND | (1.99) | [10] |
| Carbon tetrachloride | ND | (6.52) | [100] | ND | (1.30) | [20] | ND | (0.652) | [10] | ND | (0.652) | [10] |
| Chlorobenzene | ND | (8.42) | [100] | ND | (1.68) | [20] | ND | (0.842) | [10] | ND | (0.842) | [10] |
| Chloroethane | ND | (9.25) | [100] | ND | (1.85) | [20] | ND | (0.925) | [10] | ND | (0.925) | [10] |
| Chloroform | ND | (8.96) | [100] | ND | (1.79) | [20] | ND | (0.896) | [10] | ND | (0.896) | [10] |
| Chloromethane | ND | (12.7) | [100] | ND | (2.54) | [20] | ND | (1.27) | [10] | ND | (1.27) | [10] |
| Dibromochloromethane | ND | (14.0) | [100] | ND | (2.80) | [20] | ND | (1.40) | [10] | ND | (1.40) | [10] |
| Dibromomethane | ND | (14.8) | [100] | ND | (2.96) | [20] | ND | (1.48) | [10] | ND | (1.48) | [10] |
| Dichlorodifluoromethane | ND | (23.7) | [100] | ND | (4.74) | [20] | ND | (2.37) | [10] | ND | (2.37) | [10] |
| Ethylbenzene | ND | (13.6) | [100] | ND | (2.72) | [20] | ND | (1.36) | [10] | ND | (1.36) | [10] |
| Hexachloro-1,3-butadiene | ND | (33.1) | [100] | ND | (6.62) | [20] | ND | (3.31) | [10] | ND | (3.31) | [10] |
| Isopropylbenzene | ND | (9.31) | [100] | ND | (1.86) | [20] | ND | (0.931) | [10] | ND | (0.931) | [10] |
| Methylene chloride | 21.5 | (12.6) | [100] | 6.40 | B (2.52) | [20] | ND | (1.26) | [10] | ND | (1.26) | [10] |
| Naphthalene | ND | (8.01) | [100] | ND | (1.60) | [20] | ND | (0.801) | [10] | ND | (0.801) | [10] |
| Styrene | ND | (9.77) | [100] | ND | (1.95) | [20] | ND | (0.977) | [10] | ND | (0.977) | [10] |
| Tetrachloroethene | ND | (14.4) | [100] | ND | (2.88) | [20] | ND | (1.44) | [10] | ND | (1.44) | [10] |
| Toluene | ND | (6.37) | [100] | ND | (1.27) | [20] | ND | (0.637) | [10] | ND | (0.637) | [10] |
| Trichloroethene | 7170 | (13.7) | [100] | 553 | (2.74) | [20] | 298 | (1.37) | [10] | 299 | (1.37) | [10] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 21

| PARAMETER | SITE ID | | | LOCATION ID | | | SAMPLE ID | | | DATE SAMPLED | | |
|--|--|--------|---------|--|--------|--------|--|---------|--------|--|---------|--------|
| | Bldg181 WJETA061 AFP4-SPH-GW34-0 | | | Bldg181 WJETA067 AFP4-SPH-GW35-0 | | | Bldg181 WJETA058 AFP4-SPH-GW36-0 | | | Bldg181 WJETA058 AFP4-SPH-GW36-1 Dup of AFP4-SPH-GW36-0 | | |
| | 19-OCT-2000 | | | 19-OCT-2000 | | | 19-OCT-2000 | | | 19-OCT-2000 | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (10.6 |) [100] | ND | (2.12 |) [20] | ND | (1.06 |) [10] | ND | (1.06 |) [10] |
| Vinyl chloride | ND | (11.4 |) [100] | ND | (2.28 |) [20] | ND | (1.14 |) [10] | ND | (1.14 |) [10] |
| cis-1,2-Dichloroethene | ND | (11.2 |) [100] | ND | (2.24 |) [20] | ND | (1.12 |) [10] | ND | (1.12 |) [10] |
| cis-1,3-Dichloropropene | ND | (8.18 |) [100] | ND | (1.64 |) [20] | ND | (0.818 |) [10] | ND | (0.818 |) [10] |
| n-Butylbenzene | ND | (10.2 |) [100] | ND | (2.04 |) [20] | ND | (1.02 |) [10] | ND | (1.02 |) [10] |
| n-Propylbenzene | ND | (14.0 |) [100] | ND | (2.80 |) [20] | ND | (1.40 |) [10] | ND | (1.40 |) [10] |
| o-Xylene | ND | (8.44 |) [100] | ND | (1.69 |) [20] | ND | (0.844 |) [10] | ND | (0.844 |) [10] |
| p-Xylene/m-Xylene | ND | (16.7 |) [100] | ND | (3.34 |) [20] | ND | (1.67 |) [10] | ND | (1.67 |) [10] |
| sec-Butylbenzene | ND | (10.5 |) [100] | ND | (2.10 |) [20] | ND | (1.05 |) [10] | ND | (1.05 |) [10] |
| tert-Butylbenzene | ND | (9.11 |) [100] | ND | (1.82 |) [20] | ND | (0.911 |) [10] | ND | (0.911 |) [10] |
| trans-1,2-Dichloroethene | ND | (11.9 |) [100] | ND | (2.38 |) [20] | ND | (1.19 |) [10] | ND | (1.19 |) [10] |
| trans-1,3-Dichloropropene | ND | (9.08 |) [100] | ND | (1.82 |) [20] | ND | (0.908 |) [10] | ND | (0.908 |) [10] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 1

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|---|------------|------|---|------------|-------|---|------------|-----|---|-----------|-----|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA063 AFP4-SPH-GW37-0 09-NOV-2000 | | | Bldg181 WJETA062 AFP4-SPH-GW38-0 09-NOV-2000 | | | Bldg181 WJETA065 AFP4-SPH-GW39-3 09-NOV-2000 | | | Bldg181 WJETA064 AFP4-SPH-GW40-0 09-NOV-2000 | | |
| ----- | | | | | | | | | | | | |
| E415.1 - Volatile Organic Carbon (mg/L) | | | | | | | | | | | | |
| Total organic carbon | 9.90 | (0.0284) | [1] | 8.18 | (0.0284) | [1] | 24.1 | (0.142) | [5] | 13.5 | (0.142) | [5] |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (2.22) | [20] | ND | (8.31) | [100] | ND | (0.111) | [1] | ND | (0.555) | [5] |
| 1,1,1-Trichloroethane | ND | (3.38) | [20] | ND | (1.83) | [100] | ND | (0.169) | [1] | ND | (0.845) | [5] |
| 1,1,2,2-Tetrachloroethane | ND | (1.74) | [20] | ND | (7.74) | [100] | ND | (0.0870) | [1] | ND | (0.435) | [5] |
| 1,1,2-Trichloroethane | ND | (1.64) | [20] | ND | (13.3) | [100] | ND | (0.0821) | [1] | ND | (0.410) | [5] |
| 1,1-Dichloroethane | ND | (2.48) | [20] | ND | (4.16) | [100] | ND | (0.124) | [1] | ND | (0.620) | [5] |
| 1,1-Dichloroethene | ND | (2.44) | [20] | ND | (4.36) | [100] | ND | (0.122) | [1] | ND | (0.610) | [5] |
| 1,1-Dichloropropene | ND | (1.99) | [20] | ND | (5.63) | [100] | ND | (0.0994) | [1] | ND | (0.497) | [5] |
| 1,2,3-Trichlorobenzene | ND | (11.0) | [20] | ND | (26.3) | [100] | ND | (0.551) | [1] | ND | (2.76) | [5] |
| 1,2,3-Trichloropropane | ND | (5.76) | [20] | ND | (8.43) | [100] | ND | (0.288) | [1] | ND | (1.44) | [5] |
| 1,2,4-Trichlorobenzene | ND | (2.70) | [20] | ND | (17.7) | [100] | ND | (0.135) | [1] | ND | (0.675) | [5] |
| 1,2,4-Trimethylbenzene | ND | (2.48) | [20] | ND | (4.78) | [100] | ND | (0.124) | [1] | ND | (0.620) | [5] |
| 1,2-Dibromo-3-chloropropane | ND | (11.0) | [20] | ND | (118) | [100] | ND | (0.548) | [1] | ND | (2.74) | [5] |
| 1,2-Dibromoethane | ND | (2.74) | [20] | ND | (7.13) | [100] | ND | (0.137) | [1] | ND | (0.685) | [5] |
| 1,2-Dichlorobenzene | ND | (1.93) | [20] | ND | (4.88) | [100] | ND | (0.0965) | [1] | ND | (0.482) | [5] |
| 1,2-Dichloroethane | ND | (2.04) | [20] | ND | (6.19) | [100] | ND | (0.102) | [1] | ND | (0.510) | [5] |
| 1,2-Dichloropropane | ND | (1.74) | [20] | ND | (3.21) | [100] | ND | (0.0869) | [1] | ND | (0.434) | [5] |
| 1,3,5-Trimethylbenzene | ND | (1.81) | [20] | ND | (3.93) | [100] | ND | (0.0905) | [1] | ND | (0.452) | [5] |
| 1,3-Dichlorobenzene | ND | (1.69) | [20] | ND | (4.67) | [100] | ND | (0.0846) | [1] | ND | (0.423) | [5] |
| 1,3-Dichloropropane | ND | (2.70) | [20] | ND | (7.89) | [100] | ND | (0.135) | [1] | ND | (0.675) | [5] |
| 1,4-Dichlorobenzene | ND | (3.00) | [20] | ND | (4.93) | [100] | ND | (0.150) | [1] | ND | (0.750) | [5] |
| 1-Chlorohexane | ND | (1.88) | [20] | ND | (8.85) | [100] | ND | (0.0938) | [1] | ND | (0.469) | [5] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 2

| PARAMETER | SITE ID | | | LOCATION ID | | | SAMPLE ID | | | DATE SAMPLED | | |
|--|-----------------|----------|------|-----------------|----------|-------|-----------------|------------|-----|-----------------|-----------|-----|
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | WJETA063 | | | WJETA062 | | | WJETA065 | | | WJETA064 | | |
| | AFP4-SPH-GW37-0 | | | AFP4-SPH-GW38-0 | | | AFP4-SPH-GW39-3 | | | AFP4-SPH-GW40-0 | | |
| | 09-NOV-2000 | | | 09-NOV-2000 | | | 09-NOV-2000 | | | 09-NOV-2000 | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| 2,2-Dichloropropane | ND | (3.20) | [20] | ND | (6.70) | [100] | ND | (0.160) | [1] | ND | (0.800) | [5] |
| 2-Chlorotoluene | ND | (3.56) | [20] | ND | (6.89) | [100] | ND | (0.178) | [1] | ND | (0.890) | [5] |
| 4-Chlorotoluene | ND | (1.95) | [20] | ND | (7.88) | [100] | ND | (0.0974) | [1] | ND | (0.487) | [5] |
| 4-Isopropyltoluene | ND | (2.30) | [20] | ND | (5.32) | [100] | ND | (0.115) | [1] | ND | (0.575) | [5] |
| Benzene | ND | (1.28) | [20] | ND | (3.53) | [100] | ND | (0.0641) | [1] | ND | (0.320) | [5] |
| Bromobenzene | ND | (2.00) | [20] | ND | (8.02) | [100] | ND | (0.0998) | [1] | ND | (0.499) | [5] |
| Bromochloromethane | ND | (2.62) | [20] | ND | (8.10) | [100] | ND | (0.131) | [1] | ND | (0.655) | [5] |
| Bromodichloromethane | ND | (2.36) | [20] | ND | (5.67) | [100] | ND | (0.118) | [1] | ND | (0.590) | [5] |
| Bromoform | ND | (3.40) | [20] | ND | (11.8) | [100] | ND | (0.170) | [1] | ND | (0.850) | [5] |
| Bromomethane (Methylbromide) | ND | (3.98) | [20] | ND | (8.44) | [100] | ND | (0.199) | [1] | ND | (0.995) | [5] |
| Carbon tetrachloride | ND | (1.30) | [20] | ND | (9.30) | [100] | ND | (0.0652) | [1] | ND | (0.326) | [5] |
| Chlorobenzene | ND | (1.68) | [20] | ND | (2.58) | [100] | ND | (0.0842) | [1] | ND | (0.421) | [5] |
| Chloroethane | ND | (1.85) | [20] | ND | (7.01) | [100] | ND | (0.0925) | [1] | ND | (0.462) | [5] |
| Chloroform | ND | (1.79) | [20] | ND | (7.12) | [100] | ND | (0.0896) | [1] | ND | (0.448) | [5] |
| Chloromethane | ND | (2.54) | [20] | ND | (13.0) | [100] | ND | (0.127) | [1] | ND | (0.635) | [5] |
| Dibromochloromethane | ND | (2.80) | [20] | ND | (4.69) | [100] | ND | (0.140) | [1] | ND | (0.700) | [5] |
| Dibromomethane | ND | (2.96) | [20] | ND | (11.4) | [100] | ND | (0.148) | [1] | ND | (0.740) | [5] |
| Dichlorodifluoromethane | ND | (4.74) | [20] | ND | (17.5) | [100] | ND | (0.237) | [1] | ND | (1.18) | [5] |
| Ethylbenzene | ND | (2.72) | [20] | ND | (5.39) | [100] | ND | (0.136) | [1] | ND | (0.680) | [5] |
| Hexachloro-1,3-butadiene | ND | (6.62) | [20] | ND | (36.9) | [100] | ND | (0.331) | [1] | ND | (1.66) | [5] |
| Isopropylbenzene | ND | (1.86) | [20] | ND | (3.61) | [100] | ND | (0.0931) | [1] | ND | (0.466) | [5] |
| Methylene chloride | ND | (2.52) | [20] | ND | (7.89) | [100] | ND | (0.126) | [1] | ND | (0.630) | [5] |
| Naphthalene | ND | (1.60) | [20] | ND | (11.2) | [100] | ND | (0.0801) | [1] | ND | (0.400) | [5] |
| Styrene | ND | (1.95) | [20] | ND | (5.25) | [100] | ND | (0.0977) | [1] | ND | (0.488) | [5] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 3

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|---|----------|------|---|----------|-------|---|------------|------|---|-----------|-----|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA063 AFP4-SPH-GW37-0 09-NOV-2000 | | | Bldg181 WJETA062 AFP4-SPH-GW38-0 09-NOV-2000 | | | Bldg181 WJETA065 AFP4-SPH-GW39-3 09-NOV-2000 | | | Bldg181 WJETA064 AFP4-SPH-GW40-0 09-NOV-2000 | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| Tetrachloroethene | ND | (2.88) | [20] | ND | (10.9) | [100] | ND | (0.144) | [1] | ND | (0.720) | [5] |
| Toluene | ND | (1.27) | [20] | ND | (3.59) | [100] | ND | (0.0637) | [1] | ND | (0.318) | [5] |
| Trichloroethene | 1480 | (2.74) | [20] | 10700 | (68.5) | [500] | 520 | (1.37) | [10] | 272 | (0.685) | [5] |
| Trichlorofluoromethane | ND | (2.12) | [20] | ND | (6.65) | [100] | ND | (0.106) | [1] | ND | (0.530) | [5] |
| Vinyl chloride | ND | (2.28) | [20] | ND | (5.55) | [100] | ND | (0.114) | [1] | ND | (0.570) | [5] |
| cis-1,2-Dichloroethene | ND | (2.24) | [20] | ND | (4.37) | [100] | ND | (0.112) | [1] | ND | (0.560) | [5] |
| cis-1,3-Dichloropropene | ND | (1.64) | [20] | ND | (4.86) | [100] | ND | (0.0818) | [1] | ND | (0.409) | [5] |
| n-Butylbenzene | ND | (2.04) | [20] | ND | (7.61) | [100] | ND | (0.102) | [1] | ND | (0.510) | [5] |
| n-Propylbenzene | ND | (2.80) | [20] | ND | (8.24) | [100] | ND | (0.140) | [1] | ND | (0.700) | [5] |
| o-Xylene | ND | (1.69) | [20] | ND | (3.61) | [100] | ND | (0.0844) | [1] | ND | (0.422) | [5] |
| p-Xylene/m-Xylene | ND | (3.34) | [20] | ND | (8.61) | [100] | ND | (0.167) | [1] | ND | (0.835) | [5] |
| sec-Butylbenzene | ND | (2.10) | [20] | ND | (6.71) | [100] | ND | (0.105) | [1] | ND | (0.525) | [5] |
| tert-Butylbenzene | ND | (1.82) | [20] | ND | (2.66) | [100] | ND | (0.0911) | [1] | ND | (0.456) | [5] |
| trans-1,2-Dichloroethene | ND | (2.38) | [20] | ND | (9.06) | [100] | ND | (0.119) | [1] | ND | (0.595) | [5] |
| trans-1,3-Dichloropropene | ND | (1.82) | [20] | ND | (7.93) | [100] | ND | (0.0908) | [1] | ND | (0.454) | [5] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 4

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|---|---------|---------|---|----------|---------|---|---------|---------|---|---------|--------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 WJETA066 AFP4-SPH-GW41-0 09-NOV-2000 | | | Bldg181 WJETA060 AFP4-SPH-GW42-0 09-NOV-2000 | | | Bldg181 WJETA067 AFP4-SPH-GW43-0 09-NOV-2000 | | | Bldg181 WJETA058 AFP4-SPH-GW44-0 09-NOV-2000 | | |
| ----- | ----- | | | | | | | | | | | |
| E415.1 - Volatile Organic Carbon (mg/L) | | | | | | | | | | | | |
| Total organic carbon | 19.3 | (0.142 |) [5] | 8.16 | (0.0284 |) [1] | 22.2 | (0.142 |) [5] | 17.6 | (0.142 |) [5] |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (8.31 |) [100] | ND | (8.31 |) [100] | ND | (8.31 |) [100] | ND | (2.22 |) [20] |
| 1,1,1-Trichloroethane | ND | (1.83 |) [100] | ND | (1.83 |) [100] | ND | (1.83 |) [100] | ND | (3.38 |) [20] |
| 1,1,2,2-Tetrachloroethane | ND | (7.74 |) [100] | ND | (7.74 |) [100] | ND | (7.74 |) [100] | ND | (1.74 |) [20] |
| 1,1,2-Trichloroethane | ND | (13.3 |) [100] | ND | (13.3 |) [100] | ND | (13.3 |) [100] | ND | (1.64 |) [20] |
| 1,1-Dichloroethane | ND | (4.16 |) [100] | ND | (4.16 |) [100] | ND | (4.16 |) [100] | ND | (2.48 |) [20] |
| 1,1-Dichloroethene | ND | (4.36 |) [100] | ND | (4.36 |) [100] | ND | (4.36 |) [100] | ND | (2.44 |) [20] |
| 1,1-Dichloropropene | ND | (5.63 |) [100] | ND | (5.63 |) [100] | ND | (5.63 |) [100] | ND | (1.99 |) [20] |
| 1,2,3-Trichlorobenzene | ND | (26.3 |) [100] | ND | (26.3 |) [100] | ND | (26.3 |) [100] | ND | (11.0 |) [20] |
| 1,2,3-Trichloropropane | ND | (8.43 |) [100] | ND | (8.43 |) [100] | ND | (8.43 |) [100] | ND | (5.76 |) [20] |
| 1,2,4-Trichlorobenzene | ND | (17.7 |) [100] | ND | (17.7 |) [100] | ND | (17.7 |) [100] | ND | (2.70 |) [20] |
| 1,2,4-Trimethylbenzene | ND | (4.78 |) [100] | ND | (4.78 |) [100] | ND | (4.78 |) [100] | ND | (2.48 |) [20] |
| 1,2-Dibromo-3-chloropropane | ND | (118 |) [100] | ND | (118 |) [100] | ND | (118 |) [100] | ND | (11.0 |) [20] |
| 1,2-Dibromoethane | ND | (7.13 |) [100] | ND | (7.13 |) [100] | ND | (7.13 |) [100] | ND | (2.74 |) [20] |
| 1,2-Dichlorobenzene | ND | (4.88 |) [100] | ND | (4.88 |) [100] | ND | (4.88 |) [100] | ND | (1.93 |) [20] |
| 1,2-Dichloroethane | ND | (6.19 |) [100] | ND | (6.19 |) [100] | ND | (6.19 |) [100] | ND | (2.04 |) [20] |
| 1,2-Dichloropropane | ND | (3.21 |) [100] | ND | (3.21 |) [100] | ND | (3.21 |) [100] | ND | (1.74 |) [20] |
| 1,3,5-Trimethylbenzene | ND | (3.93 |) [100] | ND | (3.93 |) [100] | ND | (3.93 |) [100] | ND | (1.81 |) [20] |
| 1,3-Dichlorobenzene | ND | (4.67 |) [100] | ND | (4.67 |) [100] | ND | (4.67 |) [100] | ND | (1.69 |) [20] |
| 1,3-Dichloropropane | ND | (7.89 |) [100] | ND | (7.89 |) [100] | ND | (7.89 |) [100] | ND | (2.70 |) [20] |
| 1,4-Dichlorobenzene | ND | (4.93 |) [100] | ND | (4.93 |) [100] | ND | (4.93 |) [100] | ND | (3.00 |) [20] |
| 1-Chlorohexane | ND | (8.85 |) [100] | ND | (8.85 |) [100] | ND | (8.85 |) [100] | ND | (1.88 |) [20] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 5

| PARAMETER | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED | | | | | | | | | | | |
|--|---|--------|---------|---|--------|---------|---|--------|---------|---|--------|--------|
| | Bldg181 WJETA066 AFP4-SPH-GW41-0 09-NOV-2000 | | | Bldg181 WJETA060 AFP4-SPH-GW42-0 09-NOV-2000 | | | Bldg181 WJETA067 AFP4-SPH-GW43-0 09-NOV-2000 | | | Bldg181 WJETA058 AFP4-SPH-GW44-0 09-NOV-2000 | | |
| | ----- | | | | | | | | | | | |
| | ----- | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| 2,2-Dichloropropane | ND | (6.70 |) [100] | ND | (6.70 |) [100] | ND | (6.70 |) [100] | ND | (3.20 |) [20] |
| 2-Chlorotoluene | ND | (6.89 |) [100] | ND | (6.89 |) [100] | ND | (6.89 |) [100] | ND | (3.56 |) [20] |
| 4-Chlorotoluene | ND | (7.88 |) [100] | ND | (7.88 |) [100] | ND | (7.88 |) [100] | ND | (1.95 |) [20] |
| 4-Isopropyltoluene | ND | (5.32 |) [100] | ND | (5.32 |) [100] | ND | (5.32 |) [100] | ND | (2.30 |) [20] |
| Benzene | ND | (3.53 |) [100] | ND | (3.53 |) [100] | ND | (3.53 |) [100] | ND | (1.28 |) [20] |
| Bromobenzene | ND | (8.02 |) [100] | ND | (8.02 |) [100] | ND | (8.02 |) [100] | ND | (2.00 |) [20] |
| Bromochloromethane | ND | (8.10 |) [100] | ND | (8.10 |) [100] | ND | (8.10 |) [100] | ND | (2.62 |) [20] |
| Bromodichloromethane | ND | (5.67 |) [100] | ND | (5.67 |) [100] | ND | (5.67 |) [100] | ND | (2.36 |) [20] |
| Bromoform | ND | (11.8 |) [100] | ND | (11.8 |) [100] | ND | (11.8 |) [100] | ND | (3.40 |) [20] |
| Bromomethane (Methylbromide) | ND | (8.44 |) [100] | ND | (8.44 |) [100] | ND | (8.44 |) [100] | ND | (3.98 |) [20] |
| Carbon tetrachloride | ND | (9.30 |) [100] | ND | (9.30 |) [100] | ND | (9.30 |) [100] | ND | (1.30 |) [20] |
| Chlorobenzene | ND | (2.58 |) [100] | ND | (2.58 |) [100] | ND | (2.58 |) [100] | ND | (1.68 |) [20] |
| Chloroethane | ND | (7.01 |) [100] | ND | (7.01 |) [100] | ND | (7.01 |) [100] | ND | (1.85 |) [20] |
| Chloroform | ND | (7.12 |) [100] | ND | (7.12 |) [100] | ND | (7.12 |) [100] | ND | (1.79 |) [20] |
| Chloromethane | ND | (13.0 |) [100] | ND | (13.0 |) [100] | ND | (13.0 |) [100] | ND | (2.54 |) [20] |
| Dibromochloromethane | ND | (4.69 |) [100] | ND | (4.69 |) [100] | ND | (4.69 |) [100] | ND | (2.80 |) [20] |
| Dibromomethane | ND | (11.4 |) [100] | ND | (11.4 |) [100] | ND | (11.4 |) [100] | ND | (2.96 |) [20] |
| Dichlorodifluoromethane | ND | (17.5 |) [100] | ND | (17.5 |) [100] | ND | (17.5 |) [100] | ND | (4.74 |) [20] |
| Ethylbenzene | ND | (5.39 |) [100] | ND | (5.39 |) [100] | ND | (5.39 |) [100] | ND | (2.72 |) [20] |
| Hexachloro-1,3-butadiene | ND | (36.9 |) [100] | ND | (36.9 |) [100] | ND | (36.9 |) [100] | ND | (6.62 |) [20] |
| Isopropylbenzene | ND | (3.61 |) [100] | ND | (3.61 |) [100] | ND | (3.61 |) [100] | ND | (1.86 |) [20] |
| Methylene chloride | ND | (7.89 |) [100] | ND | (7.89 |) [100] | ND | (7.89 |) [100] | ND | (2.52 |) [20] |
| Naphthalene | ND | (11.2 |) [100] | ND | (11.2 |) [100] | ND | (11.2 |) [100] | ND | (1.60 |) [20] |
| Styrene | ND | (5.25 |) [100] | ND | (5.25 |) [100] | ND | (5.25 |) [100] | ND | (1.95 |) [20] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 6

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|-----------------|--------|---------|-----------------|--------|---------|-----------------|--------|---------|-----------------|--------|--------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | WJETA066 | | | WJETA060 | | | WJETA067 | | | WJETA058 | | |
| | AFP4-SPH-GW41-0 | | | AFP4-SPH-GW42-0 | | | AFP4-SPH-GW43-0 | | | AFP4-SPH-GW44-0 | | |
| | 09-NOV-2000 | | | 09-NOV-2000 | | | 09-NOV-2000 | | | 09-NOV-2000 | | |
| ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | | | | |
| Tetrachloroethene | ND | (10.9 |) [100] | ND | (10.9 |) [100] | ND | (10.9 |) [100] | ND | (2.88 |) [20] |
| Toluene | ND | (3.59 |) [100] | ND | (3.59 |) [100] | ND | (3.59 |) [100] | ND | (1.27 |) [20] |
| Trichloroethene | 3060 | (4.94 |) [100] | 4370 | (4.94 |) [100] | 1900 | (4.94 |) [100] | 917 | (2.74 |) [20] |
| Trichlorofluoromethane | ND | (6.65 |) [100] | ND | (6.65 |) [100] | ND | (6.65 |) [100] | ND | (2.12 |) [20] |
| Vinyl chloride | ND | (5.55 |) [100] | ND | (5.55 |) [100] | ND | (5.55 |) [100] | ND | (2.28 |) [20] |
| cis-1,2-Dichloroethene | ND | (4.37 |) [100] | ND | (4.37 |) [100] | ND | (4.37 |) [100] | ND | (2.24 |) [20] |
| cis-1,3-Dichloropropene | ND | (4.86 |) [100] | ND | (4.86 |) [100] | ND | (4.86 |) [100] | ND | (1.64 |) [20] |
| n-Butylbenzene | ND | (7.61 |) [100] | ND | (7.61 |) [100] | ND | (7.61 |) [100] | ND | (2.04 |) [20] |
| n-Propylbenzene | ND | (8.24 |) [100] | ND | (8.24 |) [100] | ND | (8.24 |) [100] | ND | (2.80 |) [20] |
| o-Xylene | ND | (3.61 |) [100] | ND | (3.61 |) [100] | ND | (3.61 |) [100] | ND | (1.69 |) [20] |
| p-Xylene/m-Xylene | ND | (8.61 |) [100] | ND | (8.61 |) [100] | ND | (8.61 |) [100] | ND | (3.34 |) [20] |
| sec-Butylbenzene | ND | (6.71 |) [100] | ND | (6.71 |) [100] | ND | (6.71 |) [100] | ND | (2.10 |) [20] |
| tert-Butylbenzene | ND | (2.66 |) [100] | ND | (2.66 |) [100] | ND | (2.66 |) [100] | ND | (1.82 |) [20] |
| trans-1,2-Dichloroethene | ND | (9.06 |) [100] | ND | (9.06 |) [100] | ND | (9.06 |) [100] | ND | (2.38 |) [20] |
| trans-1,3-Dichloropropene | ND | (7.93 |) [100] | ND | (7.93 |) [100] | ND | (7.93 |) [100] | ND | (1.82 |) [20] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 7

| PARAMETER | SITE ID | | | | | | | | |
|---|--|-----------|-------|--|-----------|-------|--|-----------|-------|
| | LOCATION ID | | | | | | | | |
| | SAMPLE ID | | | | | | | | |
| | DATE SAMPLED | | | | | | | | |
| | Bldg181 WJETA061 AFP4-SPH-GW45-0 | | | Bldg181 WJETA059 AFP4-SPH-GW46-0 | | | Bldg181 WJETA059 AFP4-SPH-GW46-1 Dup of AFP4-SPH-GW46-0 | | |
| | 09-NOV-2000 | | | 09-NOV-2000 | | | 09-NOV-2000 | | |
| ----- | | | | | | | | | |
| E415.1 - Volatile Organic Carbon (mg/L) | | | | | | | | | |
| Total organic carbon | 16.5 | (0.142) | [5] | 19.8 | (0.142) | [5] | 20.9 | (0.142) | [5] |
| SW8260B - Volatile Organic Carbons (ug/L) | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (8.31) | [100] | ND | (8.31) | [100] | ND | (8.31) | [100] |
| 1,1,1-Trichloroethane | ND | (1.83) | [100] | ND | (1.83) | [100] | ND | (1.83) | [100] |
| 1,1,2,2-Tetrachloroethane | ND | (7.74) | [100] | ND | (7.74) | [100] | ND | (7.74) | [100] |
| 1,1,2-Trichloroethane | ND | (13.3) | [100] | ND | (13.3) | [100] | ND | (13.3) | [100] |
| 1,1-Dichloroethane | ND | (4.16) | [100] | ND | (4.16) | [100] | ND | (4.16) | [100] |
| 1,1-Dichloroethene | ND | (4.36) | [100] | ND | (4.36) | [100] | ND | (4.36) | [100] |
| 1,1-Dichloropropene | ND | (5.63) | [100] | ND | (5.63) | [100] | ND | (5.63) | [100] |
| 1,2,3-Trichlorobenzene | ND | (26.3) | [100] | ND | (26.3) | [100] | ND | (26.3) | [100] |
| 1,2,3-Trichloropropane | ND | (8.43) | [100] | ND | (8.43) | [100] | ND | (8.43) | [100] |
| 1,2,4-Trichlorobenzene | ND | (17.7) | [100] | ND | (17.7) | [100] | ND | (17.7) | [100] |
| 1,2,4-Trimethylbenzene | ND | (4.78) | [100] | ND | (4.78) | [100] | ND | (4.78) | [100] |
| 1,2-Dibromo-3-chloropropane | ND | (118) | [100] | ND | (118) | [100] | ND | (118) | [100] |
| 1,2-Dibromoethane | ND | (7.13) | [100] | ND | (7.13) | [100] | ND | (7.13) | [100] |
| 1,2-Dichlorobenzene | ND | (4.88) | [100] | ND | (4.88) | [100] | ND | (4.88) | [100] |
| 1,2-Dichloroethane | ND | (6.19) | [100] | ND | (6.19) | [100] | ND | (6.19) | [100] |
| 1,2-Dichloropropane | ND | (3.21) | [100] | ND | (3.21) | [100] | ND | (3.21) | [100] |
| 1,3,5-Trimethylbenzene | ND | (3.93) | [100] | ND | (3.93) | [100] | ND | (3.93) | [100] |
| 1,3-Dichlorobenzene | ND | (4.67) | [100] | ND | (4.67) | [100] | ND | (4.67) | [100] |
| 1,3-Dichloropropane | ND | (7.89) | [100] | ND | (7.89) | [100] | ND | (7.89) | [100] |
| 1,4-Dichlorobenzene | ND | (4.93) | [100] | ND | (4.93) | [100] | ND | (4.93) | [100] |
| 1-Chlorohexane | ND | (8.85) | [100] | ND | (8.85) | [100] | ND | (8.85) | [100] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 8

| PARAMETER | Bldg181 WJETA061 AFP4-SPH-GW45-0 09-NOV-2000 | | | Bldg181 WJETA059 AFP4-SPH-GW46-0 09-NOV-2000 | | | Bldg181 WJETA059 AFP4-SPH-GW46-1 Dup of AFP4-SPH-GW46-0 09-NOV-2000 | | |
|------------------------------|---|----------|-------|---|----------|-------|---|----------|-------|
| | SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | |
| 2,2-Dichloropropane | ND | (6.70) | [100] | ND | (6.70) | [100] | ND | (6.70) | [100] |
| 2-Chlorotoluene | ND | (6.89) | [100] | ND | (6.89) | [100] | ND | (6.89) | [100] |
| 4-Chlorotoluene | ND | (7.88) | [100] | ND | (7.88) | [100] | ND | (7.88) | [100] |
| 4-Isopropyltoluene | ND | (5.32) | [100] | ND | (5.32) | [100] | ND | (5.32) | [100] |
| Benzene | ND | (3.53) | [100] | ND | (3.53) | [100] | ND | (3.53) | [100] |
| Bromobenzene | ND | (8.02) | [100] | ND | (8.02) | [100] | ND | (8.02) | [100] |
| Bromochloromethane | ND | (8.10) | [100] | ND | (8.10) | [100] | ND | (8.10) | [100] |
| Bromodichloromethane | ND | (5.67) | [100] | ND | (5.67) | [100] | ND | (5.67) | [100] |
| Bromoform | ND | (11.8) | [100] | ND | (11.8) | [100] | ND | (11.8) | [100] |
| Bromomethane (Methylbromide) | ND | (8.44) | [100] | ND | (8.44) | [100] | ND | (8.44) | [100] |
| Carbon tetrachloride | ND | (9.30) | [100] | ND | (9.30) | [100] | ND | (9.30) | [100] |
| Chlorobenzene | ND | (2.58) | [100] | ND | (2.58) | [100] | ND | (2.58) | [100] |
| Chloroethane | ND | (7.01) | [100] | ND | (7.01) | [100] | ND | (7.01) | [100] |
| Chloroform | ND | (7.12) | [100] | ND | (7.12) | [100] | ND | (7.12) | [100] |
| Chloromethane | ND | (13.0) | [100] | ND | (13.0) | [100] | ND | (13.0) | [100] |
| Dibromochloromethane | ND | (4.69) | [100] | ND | (4.69) | [100] | ND | (4.69) | [100] |
| Dibromomethane | ND | (11.4) | [100] | ND | (11.4) | [100] | ND | (11.4) | [100] |
| Dichlorodifluoromethane | ND | (17.5) | [100] | ND | (17.5) | [100] | ND | (17.5) | [100] |
| Ethylbenzene | ND | (5.39) | [100] | ND | (5.39) | [100] | ND | (5.39) | [100] |
| Hexachloro-1,3-butadiene | ND | (36.9) | [100] | ND | (36.9) | [100] | ND | (36.9) | [100] |
| Isopropylbenzene | ND | (3.61) | [100] | ND | (3.61) | [100] | ND | (3.61) | [100] |
| Methylene chloride | ND | (7.89) | [100] | ND | (7.89) | [100] | ND | (7.89) | [100] |
| Naphthalene | ND | (11.2) | [100] | ND | (11.2) | [100] | ND | (11.2) | [100] |
| Styrene | ND | (5.25) | [100] | ND | (5.25) | [100] | ND | (5.25) | [100] |

| PARAMETER | Bldg181 | | | Bldg181 | | | Bldg181 | | |
|--|-----------------|----------|-------|-----------------|----------|-------|------------------------|----------|-------|
| | WJETA061 | | | WJETA059 | | | WJETA059 | | |
| | AFP4-SPH-GW45-0 | | | AFP4-SPH-GW46-0 | | | AFP4-SPH-GW46-1 Dup of | | |
| | 09-NOV-2000 | | | 09-NOV-2000 | | | AFP4-SPH-GW46-0 | | |
| | 09-NOV-2000 | | | 09-NOV-2000 | | | 09-NOV-2000 | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/L) | | | | | | | | | |
| Tetrachloroethene | ND | (10.9) | [100] | ND | (10.9) | [100] | ND | (10.9) | [100] |
| Toluene | ND | (3.59) | [100] | ND | (3.59) | [100] | ND | (3.59) | [100] |
| Trichloroethene | 4340 | (4.94) | [100] | 7920 | (4.94) | [100] | 9620 | (4.94) | [100] |
| Trichlorofluoromethane | ND | (6.65) | [100] | ND | (6.65) | [100] | ND | (6.65) | [100] |
| Vinyl chloride | ND | (5.55) | [100] | ND | (5.55) | [100] | ND | (5.55) | [100] |
| cis-1,2-Dichloroethene | ND | (4.37) | [100] | ND | (4.37) | [100] | ND | (4.37) | [100] |
| cis-1,3-Dichloropropene | ND | (4.86) | [100] | ND | (4.86) | [100] | ND | (4.86) | [100] |
| n-Butylbenzene | ND | (7.61) | [100] | ND | (7.61) | [100] | ND | (7.61) | [100] |
| n-Propylbenzene | ND | (8.24) | [100] | ND | (8.24) | [100] | ND | (8.24) | [100] |
| o-Xylene | ND | (3.61) | [100] | ND | (3.61) | [100] | ND | (3.61) | [100] |
| p-Xylene/m-Xylene | ND | (8.61) | [100] | ND | (8.61) | [100] | ND | (8.61) | [100] |
| sec-Butylbenzene | ND | (6.71) | [100] | ND | (6.71) | [100] | ND | (6.71) | [100] |
| tert-Butylbenzene | ND | (2.66) | [100] | ND | (2.66) | [100] | ND | (2.66) | [100] |
| trans-1,2-Dichloroethene | ND | (9.06) | [100] | ND | (9.06) | [100] | ND | (9.06) | [100] |
| trans-1,3-Dichloropropene | ND | (7.93) | [100] | ND | (7.93) | [100] | ND | (7.93) | [100] |

TABLE 2

RESULTS OF INORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 1

| PARAMETER ----- | SITE ID | | LOCATION ID | | SAMPLE ID | | DATE SAMPLED | |
|--------------------|-----------------|--|-----------------|--|-----------------|--|-----------------|--|
| | Bldg181 | | Bldg181 | | Bldg181 | | Bldg181 | |
| | WJETA060 | | WJETA066 | | WJETA067 | | WJETA058 | |
| | AFP4-SPH-GW01-0 | | AFP4-SPH-GW02-0 | | AFP4-SPH-GW03-0 | | AFP4-SPH-GW04-0 | |
| | 02-MAY-2000 | | 02-MAY-2000 | | 02-MAY-2000 | | 02-MAY-2000 | |
| E300.0 (mg/L) | 14.5 | | 16.7 | | 86.5 | | 81.1 | |
| Chloride | (0.0192) [2] | | (0.0192) [2] | | (0.0959) [10] | | (0.0959) [10] | |

TABLE 2

RESULTS OF INORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH1

Page: 2

| PARAMETER ----- | SITE ID | | LOCATION ID | | SAMPLE ID | | DATE SAMPLED | |
|--------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|---|-----------------|
| | Bldg181 | | Bldg181 | | Bldg181 | | Bldg181 | |
| | WJETA059 | | WJETA061 | | WJETA065 | | WJETA065 | |
| | AFP4-SPH-GW06-0 | | AFP4-SPH-GW07-0 | | AFP4-SPH-GW08-3 | | AFP4-SPH-GW08-1 Dup of AFP4-SPH-GW08-3 | |
| | 03-MAY-2000 | | 03-MAY-2000 | | 03-MAY-2000 | | 03-MAY-2000 | |
| E300.0 (mg/L) | ----- | | ----- | | ----- | | ----- | |
| Chloride | 87.7 | (0.0959) [10] | 90.3 | (0.0959) [10] | 66.7 | (0.192) [20] | 70.5 | (0.0959) [10] |

| PARAMETER ----- | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED | | | |
|--------------------|---|-----------------|---|-----------------|
| | Bldg181 WJETA062 AFP4-SPH-GW09-0 03-MAY-2000 | | Bldg181 WJETA063 AFP4-SPH-GW10-0 03-MAY-2000 | |
| | ----- | | ----- | |
| | E300.0 (mg/L) | | | |
| Chloride | 97.1 | (0.0959) [10] | 90.3 | (0.0959) [10] |

TABLE 2

RESULTS OF INORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH2

Page: 1

| PARAMETER ----- | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED | | | | | |
|---------------------------|---|-----------|------|---|-----------|------------------------|
| | Bldg181 WJETA062 AFP4-SPH-GW14-0 21-SEP-2000 | | | Bldg181 WJETA065 AFP4-SPH-GW15-0 21-SEP-2000 | | |
| | | | | Bldg181 WJETA067 AFP4-SPH-GW16-0 21-SEP-2000 | | |
| | ----- | | | ----- | | |
| E300.0 (mg/L) Chloride | 118 | (0.288) | [10] | 58.1 | (0.144) | [5] 160 (0.577) [20] |

TABLE 2

RESULTS OF INORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 1

| PARAMETER ----- | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED | | | | | | | |
|---------------------------|---|----------------|---|----------------|---|----------------|---|----------------|
| | Bldg181 WJETA063 AFP4-SPH-GW37-0 09-NOV-2000 | | Bldg181 WJETA062 AFP4-SPH-GW38-0 09-NOV-2000 | | Bldg181 WJETA065 AFP4-SPH-GW39-3 09-NOV-2000 | | Bldg181 WJETA064 AFP4-SPH-GW40-0 09-NOV-2000 | |
| | ----- | | | | ----- | | | |
| | | | | | | | | |
| E300.0 (mg/L) Chloride | 107 | (0.577) [20] | 144 | (0.577) [20] | 158 | (0.577) [20] | 97.0 | (0.577) [20] |

TABLE 2

RESULTS OF INORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 2

| PARAMETER ----- | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED | | | | | | | | | | | | | | | |
|---------------------------|---|---|-------|--------|---|---|-------|--------|---|---|-------|--------|---|---|-------|--------|
| | Bldg181 WJETA066 AFP4-SPH-GW41-0 09-NOV-2000 | | | | Bldg181 WJETA060 AFP4-SPH-GW42-0 09-NOV-2000 | | | | Bldg181 WJETA067 AFP4-SPH-GW43-0 09-NOV-2000 | | | | Bldg181 WJETA058 AFP4-SPH-GW44-0 09-NOV-2000 | | | |
| | | | | | | | | | | | | | | | | |
| | ----- | | | | ----- | | | | ----- | | | | ----- | | | |
| E300.0 (mg/L) Chloride | 116 | (| 0.577 |) [20] | 123 | (| 0.577 |) [20] | 116 | (| 0.577 |) [20] | 113 | (| 0.577 |) [20] |

TABLE 2

RESULTS OF INORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 3

| PARAMETER ----- | SITE ID | | | LOCATION ID | | | SAMPLE ID | | | DATE SAMPLED | | |
|--------------------|-----------------|-----------|------|-----------------|-----------|------|---|-----------|------|--------------|--|--|
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | | | |
| | WJETA061 | | | WJETA059 | | | WJETA059 | | | | | |
| | AFP4-SPH-GW45-0 | | | AFP4-SPH-GW46-0 | | | AFP4-SPH-GW46-1 Dup of AFP4-SPH-GW46-0 | | | | | |
| | 09-NOV-2000 | | | 09-NOV-2000 | | | 09-NOV-2000 | | | | | |
| E300.0 (mg/L) | ----- | | | ----- | | | ----- | | | | | |
| Chloride | 221 | (0.577) | [20] | 214 | (0.577) | [20] | 201 | (0.577) | [20] | | | |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 1

| PARAMETER ----- | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED | | | | | | | |
|---|---|----------------|------|----------------|---|---------------|------|---------------|
| | Bldg181 WJETA063 AFP4-SPH-GW37-0 09-NOV-2000 | | | | Bldg181 WJETA062 AFP4-SPH-GW38-0 09-NOV-2000 | | | |
| | | | | | Bldg181 WJETA065 AFP4-SPH-GW39-3 09-NOV-2000 | | | |
| | | | | | Bldg181 WJETA064 AFP4-SPH-GW40-0 09-NOV-2000 | | | |
| E415.1 - Volatile Organic Carbon (mg/L) | | | | | | | | |
| Total organic carbon | 9.90 | (0.0284) [1] | 8.18 | (0.0284) [1] | 24.1 | (0.142) [5] | 13.5 | (0.142) [5] |

TABLE 2

RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, AFP4 SPH3

Page: 2

| PARAMETER ----- | SITE ID | | | | LOCATION ID | | | | SAMPLE ID | | | | DATE SAMPLED | | | |
|---|-----------------|---|-------|-------|-----------------|---|--------|-------|-----------------|---|-------|-------|-----------------|---|-------|-------|
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | |
| | WJETA066 | | | | WJETA060 | | | | WJETA067 | | | | WJETA058 | | | |
| | AFP4-SPH-GW41-0 | | | | AFP4-SPH-GW42-0 | | | | AFP4-SPH-GW43-0 | | | | AFP4-SPH-GW44-0 | | | |
| | 09-NOV-2000 | | | | 09-NOV-2000 | | | | 09-NOV-2000 | | | | 09-NOV-2000 | | | |
| ----- | | | | | | | | | | | | | | | | |
| E415.1 - Volatile Organic Carbon (mg/L) | | | | | | | | | | | | | | | | |
| Total organic carbon | 19.3 | (| 0.142 |) [5] | 8.16 | (| 0.0284 |) [1] | 22.2 | (| 0.142 |) [5] | 17.6 | (| 0.142 |) [5] |

| PARAMETER | SITE ID | | | LOCATION ID | | | SAMPLE ID | | | DATE SAMPLED | | |
|---|-----------------|--|--|-----------------|--|--|---|--|--|--------------|--|--|
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | | | |
| | WJETA061 | | | WJETA059 | | | WJETA059 | | | | | |
| | AFP4-SPH-GW45-0 | | | AFP4-SPH-GW46-0 | | | AFP4-SPH-GW46-1 Dup of AFP4-SPH-GW46-0 | | | | | |
| | 09-NOV-2000 | | | 09-NOV-2000 | | | 09-NOV-2000 | | | | | |
| E415.1 - Volatile Organic Carbon (mg/L) | 16.5 | | | 19.8 | | | 20.9 | | | | | |
| Total organic carbon | (0.142) [5] | | | (0.142) [5] | | | (0.142) [5] | | | | | |

Soil Sampling Results

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 1

| PARAMETER | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
|--|---|----------|-------|--|----------|-------|--|-----------|-----|--|----------|-------|
| | Bldg181 TMP3 AFP4-SPH-S001-0 01-MAY-2000 2-4 | | | Bldg181 TMP3 AFP4-SPH-S002-0 01-MAY-2000 6-8 | | | Bldg181 TMP3 AFP4-SPH-S003-0 01-MAY-2000 24-26 | | | Bldg181 TMP3 AFP4-SPH-S004-0 01-MAY-2000 28-30 | | |
| | ----- | | | | | | | | | | | |
| | ----- | | | | | | | | | | | |
| | ----- | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons (ug/kg) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (35.2) | [100] | ND | (34.7) | [100] | ND | (0.699) | [1] | ND | (37.1) | [100] |
| 1,1,1-Trichloroethane | ND | (22.3) | [100] | ND | (22.0) | [100] | ND | (0.681) | [1] | ND | (23.5) | [100] |
| 1,1,2,2-Tetrachloroethane | ND | (42.5) | [100] | ND | (42.0) | [100] | ND | (0.266) | [1] | ND | (44.8) | [100] |
| 1,1,2-Trichloroethane | ND | (34.1) | [100] | ND | (33.6) | [100] | ND | (0.424) | [1] | ND | (35.9) | [100] |
| 1,1-Dichloroethane | ND | (35.5) | [100] | ND | (35.0) | [100] | ND | (0.435) | [1] | ND | (37.4) | [100] |
| 1,1-Dichloroethene | ND | (26.0) | [100] | ND | (25.6) | [100] | ND | (0.810) | [1] | ND | (27.4) | [100] |
| 1,1-Dichloropropene | ND | (39.9) | [100] | ND | (39.4) | [100] | ND | (0.883) | [1] | ND | (42.0) | [100] |
| 1,2,3-Trichlorobenzene | ND | (58.2) | [100] | ND | (57.4) | [100] | ND | (0.834) | [1] | ND | (61.3) | [100] |
| 1,2,3-Trichloropropane | ND | (56.5) | [100] | ND | (55.7) | [100] | ND | (0.327) | [1] | ND | (59.5) | [100] |
| 1,2,4-Trichlorobenzene | ND | (62.8) | [100] | ND | (62.0) | [100] | ND | (0.875) | [1] | ND | (66.2) | [100] |
| 1,2,4-Trimethylbenzene | ND | (45.1) | [100] | ND | (44.5) | [100] | ND | (0.867) | [1] | ND | (47.5) | [100] |
| 1,2-Dibromo-3-chloropropane | ND | (46.5) | [100] | ND | (45.9) | [100] | ND | (0.752) | [1] | ND | (49.0) | [100] |
| 1,2-Dibromoethane | ND | (29.3) | [100] | ND | (28.9) | [100] | ND | (0.344) | [1] | ND | (30.8) | [100] |
| 1,2-Dichlorobenzene | ND | (30.1) | [100] | ND | (29.7) | [100] | ND | (0.642) | [1] | ND | (31.7) | [100] |
| 1,2-Dichloroethane | ND | (25.4) | [100] | ND | (25.0) | [100] | ND | (0.478) | [1] | ND | (26.7) | [100] |
| 1,2-Dichloropropane | ND | (29.3) | [100] | ND | (28.9) | [100] | ND | (0.573) | [1] | ND | (30.8) | [100] |
| 1,3,5-Trimethylbenzene | ND | (45.1) | [100] | ND | (44.4) | [100] | ND | (0.883) | [1] | ND | (47.5) | [100] |
| 1,3-Dichlorobenzene | ND | (41.5) | [100] | ND | (40.9) | [100] | ND | (0.826) | [1] | ND | (43.7) | [100] |
| 1,3-Dichloropropane | ND | (13.2) | [100] | ND | (13.0) | [100] | ND | (0.303) | [1] | ND | (13.9) | [100] |
| 1,4-Dichlorobenzene | ND | (55.9) | [100] | ND | (55.1) | [100] | ND | (0.680) | [1] | ND | (58.8) | [100] |
| 1-Chlorohexane | ND | (49.0) | [100] | ND | (48.3) | [100] | ND | (1.21) | [1] | ND | (51.6) | [100] |
| 2,2-Dichloropropane | ND | (33.6) | [100] | ND | (33.1) | [100] | ND | (1.24) | [1] | ND | (35.3) | [100] |
| 2-Chlorotoluene | ND | (66.6) | [100] | ND | (65.7) | [100] | ND | (0.818) | [1] | ND | (70.1) | [100] |
| 4-Chlorotoluene | ND | (70.8) | [100] | ND | (69.8) | [100] | ND | (0.763) | [1] | ND | (74.5) | [100] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 2

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|------------------------------|----------|-------|-----------------|----------|-------|-----------------|-----------|-----|-----------------|----------|-------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | TMP3 | | | TMP3 | | | TMP3 | | | TMP3 | | |
| | AFP4-SPH-S001-0 | | | AFP4-SPH-S002-0 | | | AFP4-SPH-S003-0 | | | AFP4-SPH-S004-0 | | |
| | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | |
| | 2-4 | | | 6-8 | | | 24-26 | | | 28-30 | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (61.2) | [100] | ND | (60.4) | [100] | ND | (1.04) | [1] | ND | (64.4) | [100] |
| Benzene | ND | (31.0) | [100] | ND | (30.6) | [100] | ND | (0.624) | [1] | ND | (32.7) | [100] |
| Bromobenzene | ND | (28.3) | [100] | ND | (27.9) | [100] | ND | (0.533) | [1] | ND | (29.8) | [100] |
| Bromochloromethane | ND | (36.5) | [100] | ND | (36.0) | [100] | ND | (0.319) | [1] | ND | (38.5) | [100] |
| Bromodichloromethane | ND | (35.2) | [100] | ND | (34.7) | [100] | ND | (0.467) | [1] | ND | (37.1) | [100] |
| Bromoform | ND | (50.8) | [100] | ND | (50.1) | [100] | ND | (2.06) | [1] | ND | (53.5) | [100] |
| Bromomethane (Methylbromide) | ND | (32.3) | [100] | ND | (31.9) | [100] | ND | (0.503) | [1] | ND | (34.1) | [100] |
| Carbon tetrachloride | ND | (41.0) | [100] | ND | (40.4) | [100] | ND | (0.804) | [1] | ND | (43.1) | [100] |
| Chlorobenzene | ND | (24.8) | [100] | ND | (24.5) | [100] | ND | (0.771) | [1] | ND | (26.2) | [100] |
| Chloroethane | ND | (39.3) | [100] | ND | (38.8) | [100] | ND | (0.575) | [1] | ND | (41.4) | [100] |
| Chloroform | ND | (14.7) | [100] | ND | (14.5) | [100] | ND | (0.558) | [1] | ND | (15.5) | [100] |
| Chloromethane | ND | (70.3) | [100] | ND | (69.4) | [100] | ND | (0.486) | [1] | ND | (74.1) | [100] |
| Dibromochloromethane | ND | (31.9) | [100] | ND | (31.5) | [100] | ND | (0.403) | [1] | ND | (33.6) | [100] |
| Dibromomethane | ND | (28.5) | [100] | ND | (28.1) | [100] | ND | (0.237) | [1] | ND | (30.0) | [100] |
| Dichlorodifluoromethane | ND | (30.1) | [100] | ND | (29.7) | [100] | ND | (1.31) | [1] | ND | (31.7) | [100] |
| Ethylbenzene | ND | (36.6) | [100] | ND | (36.1) | [100] | ND | (0.980) | [1] | ND | (38.5) | [100] |
| Hexachloro-1,3-butadiene | ND | (82.1) | [100] | ND | (81.0) | [100] | ND | (1.23) | [1] | ND | (86.5) | [100] |
| Isopropylbenzene | ND | (39.7) | [100] | ND | (39.1) | [100] | ND | (0.883) | [1] | ND | (41.8) | [100] |
| Methylene chloride | 30.6 | (23.5) | [100] | 25.3 | (23.2) | [100] | ND | (0.413) | [1] | 31.2 | (24.8) | [100] |
| Naphthalene | ND | (49.0) | [100] | ND | (48.3) | [100] | ND | (0.535) | [1] | ND | (51.6) | [100] |
| Styrene | ND | (29.5) | [100] | ND | (29.1) | [100] | ND | (0.799) | [1] | ND | (31.1) | [100] |
| Tetrachloroethene | ND | (41.8) | [100] | ND | (41.3) | [100] | ND | (1.23) | [1] | ND | (44.1) | [100] |
| Toluene | ND | (26.6) | [100] | ND | (26.2) | [100] | ND | (0.826) | [1] | ND | (28.0) | [100] |
| Trichloroethene | 277 | (37.0) | [100] | 138 | (36.5) | [100] | ND | (1.01) | [1] | 371 | (39.0) | [100] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 3

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|------------------------------|----------|-------|-----------------|----------|-------|-----------------|-----------|-----|-----------------|----------|-------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | TMP3 | | | TMP3 | | | TMP3 | | | TMP3 | | |
| | AFP4-SPH-S001-0 | | | AFP4-SPH-S002-0 | | | AFP4-SPH-S003-0 | | | AFP4-SPH-S004-0 | | |
| | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | |
| | 2-4 | | | 6-8 | | | 24-26 | | | 28-30 | | |
| ----- | ----- | | | ----- | | | ----- | | | ----- | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (34.2) | [100] | ND | (33.8) | [100] | ND | (0.907) | [1] | ND | (36.1) | [100] |
| Vinyl chloride | ND | (31.5) | [100] | ND | (31.0) | [100] | ND | (0.718) | [1] | ND | (33.1) | [100] |
| cis-1,2-Dichloroethene | ND | (24.1) | [100] | ND | (23.8) | [100] | ND | (0.643) | [1] | ND | (25.4) | [100] |
| cis-1,3-Dichloropropene | ND | (28.1) | [100] | ND | (27.7) | [100] | ND | (0.466) | [1] | ND | (29.6) | [100] |
| n-Butylbenzene | ND | (72.5) | [100] | ND | (71.5) | [100] | ND | (0.988) | [1] | ND | (76.4) | [100] |
| n-Propylbenzene | ND | (64.4) | [100] | ND | (63.5) | [100] | ND | (0.980) | [1] | ND | (67.8) | [100] |
| o-Xylene | ND | (40.9) | [100] | ND | (40.3) | [100] | ND | (0.713) | [1] | ND | (43.0) | [100] |
| p-Xylene/m-Xylene | ND | (69.7) | [100] | ND | (68.8) | [100] | ND | (1.88) | [1] | ND | (73.4) | [100] |
| sec-Butylbenzene | ND | (54.2) | [100] | ND | (53.5) | [100] | ND | (0.948) | [1] | ND | (57.1) | [100] |
| tert-Butylbenzene | ND | (43.7) | [100] | ND | (43.2) | [100] | ND | (0.842) | [1] | ND | (46.1) | [100] |
| trans-1,2-Dichloroethene | ND | (28.4) | [100] | ND | (28.0) | [100] | ND | (0.818) | [1] | ND | (29.9) | [100] |
| trans-1,3-Dichloropropene | ND | (39.0) | [100] | ND | (38.5) | [100] | ND | (0.454) | [1] | ND | (41.1) | [100] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 4

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|------------------------------|--------|---------|-----------------|--------|---------|---|--------|---------|-----------------|---------|-------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
| PARAMETER | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | TMP3 | | | TMP1 | | | TMP1 | | | TMP1 | | |
| | AFP4-SPH-S005-0 | | | AFP4-SPH-S006-0 | | | AFP4-SPH-S006-1 Dup of AFP4-SPH-S006-0 | | | AFP4-SPH-S007-0 | | |
| | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | |
| | 30-32 | | | 4-6 | | | 4-6 | | | 6-8 | | |
| SW8260B - Volatile Organic Carbons (ug/kg) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (37.4 |) [100] | ND | (37.2 |) [100] | ND | (35.0 |) [100] | ND | (0.778 |) [1] |
| 1,1,1-Trichloroethane | ND | (23.7 |) [100] | ND | (23.6 |) [100] | ND | (22.2 |) [100] | ND | (0.758 |) [1] |
| 1,1,2,2-Tetrachloroethane | ND | (45.2 |) [100] | ND | (44.9 |) [100] | ND | (42.3 |) [100] | ND | (0.296 |) [1] |
| 1,1,2-Trichloroethane | ND | (36.2 |) [100] | ND | (36.0 |) [100] | ND | (33.9 |) [100] | ND | (0.471 |) [1] |
| 1,1-Dichloroethane | ND | (37.7 |) [100] | ND | (37.4 |) [100] | ND | (35.3 |) [100] | ND | (0.484 |) [1] |
| 1,1-Dichloroethene | ND | (27.6 |) [100] | ND | (27.4 |) [100] | ND | (25.8 |) [100] | ND | (0.901 |) [1] |
| 1,1-Dichloropropene | ND | (42.4 |) [100] | ND | (42.1 |) [100] | ND | (39.7 |) [100] | ND | (0.982 |) [1] |
| 1,2,3-Trichlorobenzene | ND | (61.9 |) [100] | ND | (61.5 |) [100] | ND | (57.9 |) [100] | ND | (0.928 |) [1] |
| 1,2,3-Trichloropropane | ND | (60.0 |) [100] | ND | (59.6 |) [100] | ND | (56.2 |) [100] | ND | (0.364 |) [1] |
| 1,2,4-Trichlorobenzene | ND | (66.8 |) [100] | ND | (66.3 |) [100] | ND | (62.5 |) [100] | ND | (0.973 |) [1] |
| 1,2,4-Trimethylbenzene | ND | (48.0 |) [100] | ND | (47.7 |) [100] | ND | (44.9 |) [100] | ND | (0.964 |) [1] |
| 1,2-Dibromo-3-chloropropane | ND | (49.5 |) [100] | ND | (49.1 |) [100] | ND | (46.3 |) [100] | ND | (0.836 |) [1] |
| 1,2-Dibromoethane | ND | (31.1 |) [100] | ND | (30.9 |) [100] | ND | (29.1 |) [100] | ND | (0.383 |) [1] |
| 1,2-Dichlorobenzene | ND | (32.0 |) [100] | ND | (31.7 |) [100] | ND | (29.9 |) [100] | ND | (0.715 |) [1] |
| 1,2-Dichloroethane | ND | (27.0 |) [100] | ND | (26.8 |) [100] | ND | (25.2 |) [100] | ND | (0.532 |) [1] |
| 1,2-Dichloropropane | ND | (31.1 |) [100] | ND | (30.9 |) [100] | ND | (29.1 |) [100] | ND | (0.637 |) [1] |
| 1,3,5-Trimethylbenzene | ND | (47.9 |) [100] | ND | (47.6 |) [100] | ND | (44.8 |) [100] | ND | (0.982 |) [1] |
| 1,3-Dichlorobenzene | ND | (44.1 |) [100] | ND | (43.8 |) [100] | ND | (41.3 |) [100] | ND | (0.919 |) [1] |
| 1,3-Dichloropropane | ND | (14.0 |) [100] | ND | (13.9 |) [100] | ND | (13.1 |) [100] | ND | (0.337 |) [1] |
| 1,4-Dichlorobenzene | ND | (59.4 |) [100] | ND | (59.0 |) [100] | ND | (55.6 |) [100] | ND | (0.756 |) [1] |
| 1-Chlorohexane | ND | (52.1 |) [100] | ND | (51.7 |) [100] | ND | (48.7 |) [100] | ND | (1.34 |) [1] |
| 2,2-Dichloropropane | ND | (35.7 |) [100] | ND | (35.4 |) [100] | ND | (33.4 |) [100] | ND | (1.38 |) [1] |
| 2-Chlorotoluene | ND | (70.8 |) [100] | ND | (70.3 |) [100] | ND | (66.2 |) [100] | ND | (0.910 |) [1] |
| 4-Chlorotoluene | ND | (75.2 |) [100] | ND | (74.7 |) [100] | ND | (70.4 |) [100] | ND | (0.849 |) [1] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 5

| | SITE ID | | | | | | | | | | | |
|---|------------------------------|----------|-------|-----------------|----------|-------|---|----------|--------|-----------------|-----------|-----|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | TMP3 | | | TMP1 | | | TMP1 | | | TMP1 | | |
| | AFP4-SPH-S005-0 | | | AFP4-SPH-S006-0 | | | AFP4-SPH-S006-1 Dup of AFP4-SPH-S006-0 | | | AFP4-SPH-S007-0 | | |
| | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | |
| PARAMETER | 30-32 | | | 4-6 | | | 4-6 | | | 6-8 | | |
| ----- | ----- | | | ----- | | | ----- | | | ----- | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (65.0) | [100] | ND | (64.6) | [100] | ND | (60.8) | [100] | ND | (1.16) | [1] |
| Benzene | ND | (33.0) | [100] | ND | (32.8) | [100] | ND | (30.9) | [100] | ND | (0.695) | [1] |
| Bromobenzene | ND | (30.1) | [100] | ND | (29.9) | [100] | ND | (28.2) | [100] | ND | (0.593) | [1] |
| Bromochloromethane | ND | (38.8) | [100] | ND | (38.5) | [100] | ND | (36.3) | [100] | ND | (0.355) | [1] |
| Bromodichloromethane | ND | (37.4) | [100] | ND | (37.2) | [100] | ND | (35.0) | [100] | ND | (0.519) | [1] |
| Bromoform | ND | (54.0) | [100] | ND | (53.6) | [100] | ND | (50.5) | [100] | ND | (2.29) | [1] |
| Bromomethane (Methylbromide) | ND | (34.4) | [100] | ND | (34.1) | [100] | ND | (32.2) | [100] | ND | (0.560) | [1] |
| Carbon tetrachloride | ND | (43.5) | [100] | ND | (43.2) | [100] | ND | (40.7) | [100] | ND | (0.895) | [1] |
| Chlorobenzene | ND | (26.4) | [100] | ND | (26.2) | [100] | ND | (24.7) | [100] | ND | (0.858) | [1] |
| Chloroethane | ND | (41.8) | [100] | ND | (41.5) | [100] | ND | (39.1) | [100] | ND | (0.640) | [1] |
| Chloroform | ND | (15.7) | [100] | ND | (15.5) | [100] | ND | (14.6) | [100] | ND | (0.621) | [1] |
| Chloromethane | ND | (74.8) | [100] | ND | (74.2) | [100] | ND | (69.9) | [100] | ND | (0.541) | [1] |
| Dibromochloromethane | ND | (33.9) | [100] | ND | (33.7) | [100] | ND | (31.7) | [100] | ND | (0.449) | [1] |
| Dibromomethane | ND | (30.3) | [100] | ND | (30.1) | [100] | ND | (28.3) | [100] | ND | (0.263) | [1] |
| Dichlorodifluoromethane | ND | (32.0) | [100] | ND | (31.7) | [100] | ND | (29.9) | [100] | ND | (1.46) | [1] |
| Ethylbenzene | ND | (38.9) | [100] | ND | (38.6) | [100] | ND | (36.4) | [100] | ND | (1.09) | [1] |
| Hexachloro-1,3-butadiene | ND | (87.3) | [100] | ND | (86.7) | [100] | ND | (81.7) | [100] | ND | (1.37) | [1] |
| Isopropylbenzene | ND | (42.2) | [100] | ND | (41.9) | [100] | ND | (39.4) | [100] | ND | (0.982) | [1] |
| Methylene chloride | 30.6 | (25.0) | [100] | 30.6 | (24.8) | [100] | 28.8 | (23.4) | [100] | ND | (0.460) | [1] |
| Naphthalene | ND | (52.1) | [100] | ND | (51.7) | [100] | ND | (48.7) | [100] | ND | (0.595) | [1] |
| Styrene | ND | (31.4) | [100] | ND | (31.2) | [100] | ND | (29.4) | [100] | ND | (0.888) | [1] |
| Tetrachloroethene | ND | (44.5) | [100] | ND | (44.2) | [100] | ND | (41.6) | [100] | ND | (1.37) | [1] |
| Toluene | ND | (28.3) | [100] | ND | (28.1) | [100] | ND | (26.4) | [100] | ND | (0.919) | [1] |
| Trichloroethene | 1200 | (39.4) | [100] | 18300 | (39.1) | [100] | 67600 | (376) | [1000] | ND | (1.13) | [1] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 6

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|------------------------------|--------|---------|-----------------|--------|---------|---|--------|---------|-----------------|---------|-------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | TMP3 | | | TMP1 | | | TMP1 | | | TMP1 | | |
| | AFP4-SPH-S005-0 | | | AFP4-SPH-S006-0 | | | AFP4-SPH-S006-1 Dup of AFP4-SPH-S006-0 | | | AFP4-SPH-S007-0 | | |
| | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | | 01-MAY-2000 | | |
| | 30-32 | | | 4-6 | | | 4-6 | | | 6-8 | | |
| ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (36.4 |) [100] | ND | (36.2 |) [100] | ND | (34.1 |) [100] | ND | (1.01 |) [1] |
| Vinyl chloride | ND | (33.4 |) [100] | ND | (33.2 |) [100] | ND | (31.3 |) [100] | ND | (0.798 |) [1] |
| cis-1,2-Dichloroethene | ND | (25.7 |) [100] | ND | (25.5 |) [100] | ND | (24.0 |) [100] | ND | (0.715 |) [1] |
| cis-1,3-Dichloropropene | ND | (29.8 |) [100] | ND | (29.6 |) [100] | ND | (27.9 |) [100] | ND | (0.518 |) [1] |
| n-Butylbenzene | ND | (77.1 |) [100] | ND | (76.5 |) [100] | ND | (72.1 |) [100] | ND | (1.10 |) [1] |
| n-Propylbenzene | ND | (68.5 |) [100] | ND | (68.0 |) [100] | ND | (64.1 |) [100] | ND | (1.09 |) [1] |
| o-Xylene | ND | (43.5 |) [100] | ND | (43.1 |) [100] | ND | (40.7 |) [100] | ND | (0.793 |) [1] |
| p-Xylene/m-Xylene | ND | (74.1 |) [100] | ND | (73.6 |) [100] | ND | (69.3 |) [100] | ND | (2.09 |) [1] |
| sec-Butylbenzene | ND | (57.6 |) [100] | ND | (57.2 |) [100] | ND | (53.9 |) [100] | ND | (1.05 |) [1] |
| tert-Butylbenzene | ND | (46.5 |) [100] | ND | (46.2 |) [100] | ND | (43.5 |) [100] | ND | (0.937 |) [1] |
| trans-1,2-Dichloroethene | ND | (30.2 |) [100] | ND | (30.0 |) [100] | ND | (28.3 |) [100] | ND | (0.910 |) [1] |
| trans-1,3-Dichloropropene | ND | (41.5 |) [100] | ND | (41.2 |) [100] | ND | (38.8 |) [100] | ND | (0.505 |) [1] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 7

| PARAMETER | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
|--|---|---------|-------|--|---------|-------|--|--------|---------|--|---------|-------|
| | Bldg181 TMP1 AFP4-SPH-S008-0 01-MAY-2000 14-16 | | | Bldg181 TMP1 AFP4-SPH-S009-0 01-MAY-2001 24-26 | | | Bldg181 TMP1 AFP4-SPH-S010-0 01-MAY-2000 30-32 | | | Bldg181 TMP2 AFP4-SPH-S011-0 02-MAY-2000 2-4 | | |
| | ----- | | | | | | | | | | | |
| | ----- | | | | | | | | | | | |
| | ----- | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons (ug/kg) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (0.785 |) [1] | ND | (0.770 |) [1] | ND | (29.5 |) [100] | ND | (0.271 |) [1] |
| 1,1,1-Trichloroethane | ND | (0.765 |) [1] | ND | (0.751 |) [1] | ND | (61.1 |) [100] | ND | (0.560 |) [1] |
| 1,1,2,2-Tetrachloroethane | ND | (0.298 |) [1] | ND | (0.293 |) [1] | ND | (52.2 |) [100] | ND | (0.479 |) [1] |
| 1,1,2-Trichloroethane | ND | (0.476 |) [1] | ND | (0.467 |) [1] | ND | (47.4 |) [100] | ND | (0.434 |) [1] |
| 1,1-Dichloroethane | ND | (0.488 |) [1] | ND | (0.479 |) [1] | ND | (47.3 |) [100] | ND | (0.433 |) [1] |
| 1,1-Dichloroethene | ND | (0.910 |) [1] | ND | (0.893 |) [1] | ND | (75.3 |) [100] | ND | (0.690 |) [1] |
| 1,1-Dichloropropene | ND | (0.991 |) [1] | ND | (0.973 |) [1] | ND | (74.5 |) [100] | ND | (0.683 |) [1] |
| 1,2,3-Trichlorobenzene | ND | (0.937 |) [1] | ND | (0.919 |) [1] | ND | (70.3 |) [100] | ND | (0.644 |) [1] |
| 1,2,3-Trichloropropane | ND | (0.367 |) [1] | ND | (0.361 |) [1] | ND | (60.2 |) [100] | ND | (0.552 |) [1] |
| 1,2,4-Trichlorobenzene | ND | (0.982 |) [1] | ND | (0.964 |) [1] | ND | (117 |) [100] | ND | (1.08 |) [1] |
| 1,2,4-Trimethylbenzene | ND | (0.973 |) [1] | ND | (0.955 |) [1] | ND | (92.3 |) [100] | ND | (0.846 |) [1] |
| 1,2-Dibromo-3-chloropropane | ND | (0.844 |) [1] | ND | (0.828 |) [1] | ND | (81.4 |) [100] | ND | (0.746 |) [1] |
| 1,2-Dibromoethane | ND | (0.387 |) [1] | ND | (0.379 |) [1] | ND | (47.4 |) [100] | ND | (0.434 |) [1] |
| 1,2-Dichlorobenzene | ND | (0.721 |) [1] | ND | (0.708 |) [1] | ND | (64.3 |) [100] | ND | (0.589 |) [1] |
| 1,2-Dichloroethane | ND | (0.537 |) [1] | ND | (0.527 |) [1] | ND | (67.9 |) [100] | ND | (0.623 |) [1] |
| 1,2-Dichloropropane | ND | (0.643 |) [1] | ND | (0.631 |) [1] | ND | (31.8 |) [100] | ND | (0.291 |) [1] |
| 1,3,5-Trimethylbenzene | ND | (0.991 |) [1] | ND | (0.973 |) [1] | ND | (96.3 |) [100] | ND | (0.883 |) [1] |
| 1,3-Dichlorobenzene | ND | (0.928 |) [1] | ND | (0.910 |) [1] | ND | (75.8 |) [100] | ND | (0.695 |) [1] |
| 1,3-Dichloropropane | ND | (0.340 |) [1] | ND | (0.334 |) [1] | ND | (32.9 |) [100] | ND | (0.301 |) [1] |
| 1,4-Dichlorobenzene | ND | (0.763 |) [1] | ND | (0.749 |) [1] | ND | (79.7 |) [100] | ND | (0.730 |) [1] |
| 1-Chlorohexane | ND | (1.36 |) [1] | ND | (1.33 |) [1] | ND | (85.4 |) [100] | ND | (0.783 |) [1] |
| 2,2-Dichloropropane | ND | (1.39 |) [1] | ND | (1.37 |) [1] | ND | (70.3 |) [100] | ND | (0.644 |) [1] |
| 2-Chlorotoluene | ND | (0.919 |) [1] | ND | (0.901 |) [1] | ND | (78.9 |) [100] | ND | (0.723 |) [1] |
| 4-Chlorotoluene | ND | (0.857 |) [1] | ND | (0.841 |) [1] | ND | (68.9 |) [100] | ND | (0.632 |) [1] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 8

| | SITE ID | | | | LOCATION ID | | | | SAMPLE ID | | | | DATE SAMPLED | | | | BEG. DEPTH - END DEPTH (FT.) | | | |
|---|-----------------|---------|-------|----|-----------------|-------|------|--------|-----------------|----|---------|-------|-----------------|---------|-------|----|------------------------------|-------|--|--|
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | | | | |
| | TMP1 | | | | TMP1 | | | | TMP1 | | | | TMP2 | | | | | | | |
| | AFP4-SPH-S008-0 | | | | AFP4-SPH-S009-0 | | | | AFP4-SPH-S010-0 | | | | AFP4-SPH-S011-0 | | | | | | | |
| | 01-MAY-2000 | | | | 01-MAY-2001 | | | | 01-MAY-2000 | | | | 02-MAY-2000 | | | | | | | |
| PARAMETER | 14-16 | | | | 24-26 | | | | 30-32 | | | | 2-4 | | | | | | | |
| ----- | | | | | | | | | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (1.17 |) [1] | ND | (1.15 |) [1] | ND | (109 |) [100] | ND | (0.995 |) [1] | ND | (0.352 |) [1] | ND | (0.499 |) [1] | | |
| Benzene | ND | (0.701 |) [1] | ND | (0.688 |) [1] | ND | (38.4 |) [100] | ND | (0.352 |) [1] | ND | (0.499 |) [1] | ND | (0.486 |) [1] | | |
| Bromobenzene | ND | (0.598 |) [1] | ND | (0.587 |) [1] | ND | (54.5 |) [100] | ND | (0.499 |) [1] | ND | (0.486 |) [1] | ND | (0.370 |) [1] | | |
| Bromochloromethane | ND | (0.358 |) [1] | ND | (0.352 |) [1] | ND | (53.0 |) [100] | ND | (0.486 |) [1] | ND | (0.370 |) [1] | ND | (0.452 |) [1] | | |
| Bromodichloromethane | ND | (0.524 |) [1] | ND | (0.514 |) [1] | ND | (40.4 |) [100] | ND | (0.370 |) [1] | ND | (0.452 |) [1] | ND | (0.448 |) [1] | | |
| Bromoform | ND | (2.31 |) [1] | ND | (2.27 |) [1] | ND | (49.4 |) [100] | ND | (0.452 |) [1] | ND | (0.448 |) [1] | ND | (0.497 |) [1] | | |
| Bromomethane (Methylbromide) | ND | (0.565 |) [1] | ND | (0.554 |) [1] | ND | (48.9 |) [100] | ND | (0.448 |) [1] | ND | (0.497 |) [1] | ND | (0.442 |) [1] | | |
| Carbon tetrachloride | ND | (0.903 |) [1] | ND | (0.886 |) [1] | ND | (54.2 |) [100] | ND | (0.497 |) [1] | ND | (0.442 |) [1] | ND | (0.537 |) [1] | | |
| Chlorobenzene | ND | (0.866 |) [1] | ND | (0.850 |) [1] | ND | (48.3 |) [100] | ND | (0.442 |) [1] | ND | (0.537 |) [1] | ND | (0.478 |) [1] | | |
| Chloroethane | ND | (0.646 |) [1] | ND | (0.634 |) [1] | ND | (58.6 |) [100] | ND | (0.537 |) [1] | ND | (0.478 |) [1] | ND | (0.511 |) [1] | | |
| Chloroform | ND | (0.627 |) [1] | ND | (0.615 |) [1] | ND | (52.1 |) [100] | ND | (0.478 |) [1] | ND | (0.511 |) [1] | ND | (0.402 |) [1] | | |
| Chloromethane | ND | (0.546 |) [1] | ND | (0.536 |) [1] | ND | (55.8 |) [100] | ND | (0.511 |) [1] | ND | (0.402 |) [1] | ND | (0.486 |) [1] | | |
| Dibromochloromethane | ND | (0.453 |) [1] | ND | (0.444 |) [1] | ND | (43.8 |) [100] | ND | (0.402 |) [1] | ND | (0.486 |) [1] | ND | (0.551 |) [1] | | |
| Dibromomethane | ND | (0.266 |) [1] | ND | (0.261 |) [1] | ND | (53.0 |) [100] | ND | (0.486 |) [1] | ND | (0.551 |) [1] | ND | (0.523 |) [1] | | |
| Dichlorodifluoromethane | ND | (1.47 |) [1] | ND | (1.45 |) [1] | ND | (113 |) [100] | ND | (1.03 |) [1] | ND | (0.478 |) [1] | ND | (0.895 |) [1] | | |
| Ethylbenzene | ND | (1.10 |) [1] | ND | (1.08 |) [1] | ND | (52.1 |) [100] | ND | (0.478 |) [1] | ND | (0.895 |) [1] | ND | (0.551 |) [1] | | |
| Hexachloro-1,3-butadiene | ND | (1.38 |) [1] | ND | (1.36 |) [1] | ND | (97.6 |) [100] | ND | (0.895 |) [1] | ND | (0.551 |) [1] | ND | (0.523 |) [1] | | |
| Isopropylbenzene | ND | (0.991 |) [1] | ND | (0.973 |) [1] | ND | (60.1 |) [100] | ND | (0.551 |) [1] | ND | (0.523 |) [1] | ND | (0.448 |) [1] | | |
| Methylene chloride | ND | (0.464 |) [1] | ND | (0.455 |) [1] | 49.3 | (57.1 |) [100] | ND | (0.523 |) [1] | ND | (0.448 |) [1] | ND | (0.755 |) [1] | | |
| Naphthalene | ND | (0.600 |) [1] | ND | (0.589 |) [1] | ND | (48.9 |) [100] | ND | (0.448 |) [1] | ND | (0.755 |) [1] | ND | (0.713 |) [1] | | |
| Styrene | ND | (0.897 |) [1] | ND | (0.880 |) [1] | ND | (82.3 |) [100] | ND | (0.755 |) [1] | ND | (0.713 |) [1] | ND | (0.470 |) [1] | | |
| Tetrachloroethene | ND | (1.38 |) [1] | ND | (1.36 |) [1] | ND | (77.8 |) [100] | ND | (0.713 |) [1] | ND | (0.470 |) [1] | ND | | | | |
| Toluene | ND | (0.928 |) [1] | ND | (0.910 |) [1] | ND | (51.2 |) [100] | ND | (0.470 |) [1] | ND | | | ND | | | | |
| Trichloroethene | ND | (1.14 |) [1] | ND | (1.12 |) [1] | 1930 | (42.8 |) [100] | ND | (0.393 |) [1] | | | | | | | | |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 9

| | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | | | | | |
|---|---|-----------|-----|----|--|-----|----|----------|--|----|-----------|-----|--|--|--|--|
| | Bldg181 TMP1 AFP4-SPH-S008-0 01-MAY-2000 14-16 | | | | Bldg181 TMP1 AFP4-SPH-S009-0 01-MAY-2001 24-26 | | | | Bldg181 TMP1 AFP4-SPH-S010-0 01-MAY-2000 30-32 | | | | Bldg181 TMP2 AFP4-SPH-S011-0 02-MAY-2000 2-4 | | | |
| PARAMETER | ----- | | | | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (1.02) | [1] | ND | (1.00) | [1] | ND | (111) | [100] | ND | (1.01) | [1] | | | | |
| Vinyl chloride | ND | (0.806) | [1] | ND | (0.791) | [1] | ND | (86.4) | [100] | ND | (0.792) | [1] | | | | |
| cis-1,2-Dichloroethene | ND | (0.722) | [1] | ND | (0.709) | [1] | ND | (55.6) | [100] | ND | (0.509) | [1] | | | | |
| cis-1,3-Dichloropropene | ND | (0.523) | [1] | ND | (0.513) | [1] | ND | (29.3) | [100] | ND | (0.269) | [1] | | | | |
| n-Butylbenzene | ND | (1.11) | [1] | ND | (1.09) | [1] | ND | (117) | [100] | ND | (1.08) | [1] | | | | |
| n-Propylbenzene | ND | (1.10) | [1] | ND | (1.08) | [1] | ND | (112) | [100] | ND | (1.02) | [1] | | | | |
| o-Xylene | ND | (0.800) | [1] | ND | (0.785) | [1] | ND | (49.1) | [100] | ND | (0.450) | [1] | | | | |
| p-Xylene/m-Xylene | ND | (2.11) | [1] | ND | (2.07) | [1] | ND | (150) | [100] | ND | (1.38) | [1] | | | | |
| sec-Butylbenzene | ND | (1.06) | [1] | ND | (1.04) | [1] | ND | (96.5) | [100] | ND | (0.885) | [1] | | | | |
| tert-Butylbenzene | ND | (0.946) | [1] | ND | (0.928) | [1] | ND | (105) | [100] | ND | (0.959) | [1] | | | | |
| trans-1,2-Dichloroethene | ND | (0.919) | [1] | ND | (0.901) | [1] | ND | (62.0) | [100] | ND | (0.568) | [1] | | | | |
| trans-1,3-Dichloropropene | ND | (0.509) | [1] | ND | (0.500) | [1] | ND | (21.1) | [100] | ND | (0.194) | [1] | | | | |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 10

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|--|----------|-------|--|----------|-------|--|-----------|-----|--|----------|-------|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
| | Bldg181 TMP2 AFP4-SPH-S012-0 02-MAY-2000 4-6 | | | Bldg181 TMP2 AFP4-SPH-S013-0 02-MAY-2000 10-12 | | | Bldg181 TMP2 AFP4-SPH-S014-3 02-MAY-2000 12-14 | | | Bldg181 TMP2 AFP4-SPH-S015-0 02-MAY-2000 16-18 | | |
| SW8260B - Volatile Organic Carbons (ug/kg) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (29.3) | [100] | ND | (27.1) | [100] | ND | (0.265) | [1] | ND | (26.9) | [100] |
| 1,1,1-Trichloroethane | ND | (60.6) | [100] | ND | (56.1) | [100] | ND | (0.550) | [1] | ND | (55.6) | [100] |
| 1,1,2,2-Tetrachloroethane | ND | (51.8) | [100] | ND | (47.9) | [100] | ND | (0.470) | [1] | ND | (47.5) | [100] |
| 1,1,2-Trichloroethane | ND | (47.0) | [100] | ND | (43.5) | [100] | ND | (0.426) | [1] | ND | (43.1) | [100] |
| 1,1-Dichloroethane | ND | (46.9) | [100] | ND | (43.4) | [100] | ND | (0.425) | [1] | ND | (43.1) | [100] |
| 1,1-Dichloroethene | ND | (74.7) | [100] | ND | (69.1) | [100] | ND | (0.677) | [1] | ND | (68.6) | [100] |
| 1,1-Dichloropropene | ND | (73.9) | [100] | ND | (68.4) | [100] | ND | (0.670) | [1] | ND | (67.9) | [100] |
| 1,2,3-Trichlorobenzene | ND | (69.7) | [100] | ND | (64.5) | [100] | ND | (0.632) | [1] | ND | (64.0) | [100] |
| 1,2,3-Trichloropropane | ND | (59.7) | [100] | ND | (55.2) | [100] | ND | (0.542) | [1] | ND | (54.8) | [100] |
| 1,2,4-Trichlorobenzene | ND | (116) | [100] | ND | (108) | [100] | ND | (1.06) | [1] | ND | (107) | [100] |
| 1,2,4-Trimethylbenzene | ND | (91.5) | [100] | ND | (84.7) | [100] | ND | (0.830) | [1] | 19.3 | (84.0) | [100] |
| 1,2-Dibromo-3-chloropropane | ND | (80.7) | [100] | ND | (74.7) | [100] | ND | (0.733) | [1] | ND | (74.2) | [100] |
| 1,2-Dibromoethane | ND | (47.0) | [100] | ND | (43.5) | [100] | ND | (0.426) | [1] | ND | (43.1) | [100] |
| 1,2-Dichlorobenzene | ND | (63.7) | [100] | ND | (59.0) | [100] | ND | (0.578) | [1] | ND | (58.5) | [100] |
| 1,2-Dichloroethane | ND | (67.3) | [100] | ND | (62.3) | [100] | ND | (0.611) | [1] | ND | (61.8) | [100] |
| 1,2-Dichloropropane | ND | (31.5) | [100] | ND | (29.2) | [100] | ND | (0.286) | [1] | ND | (28.9) | [100] |
| 1,3,5-Trimethylbenzene | ND | (95.5) | [100] | ND | (88.4) | [100] | ND | (0.867) | [1] | ND | (87.7) | [100] |
| 1,3-Dichlorobenzene | ND | (75.2) | [100] | ND | (69.5) | [100] | ND | (0.682) | [1] | 17.8 | (69.0) | [100] |
| 1,3-Dichloropropane | ND | (32.6) | [100] | ND | (30.2) | [100] | ND | (0.296) | [1] | ND | (29.9) | [100] |
| 1,4-Dichlorobenzene | ND | (79.0) | [100] | ND | (73.1) | [100] | ND | (0.717) | [1] | ND | (72.5) | [100] |
| 1-Chlorohexane | ND | (84.7) | [100] | ND | (78.3) | [100] | ND | (0.768) | [1] | ND | (77.8) | [100] |
| 2,2-Dichloropropane | ND | (69.7) | [100] | ND | (64.5) | [100] | ND | (0.632) | [1] | ND | (64.0) | [100] |
| 2-Chlorotoluene | ND | (78.2) | [100] | ND | (72.4) | [100] | ND | (0.709) | [1] | ND | (71.8) | [100] |
| 4-Chlorotoluene | ND | (68.3) | [100] | ND | (63.2) | [100] | ND | (0.620) | [1] | ND | (62.7) | [100] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 11

| PARAMETER | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
|---|---|----------|-------|-----------------|----------|-------|-----------------|-----------|-----|-----------------|----------|-------|
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | TMP2 | | | TMP2 | | | TMP2 | | | TMP2 | | |
| | AFP4-SPH-S012-0 | | | AFP4-SPH-S013-0 | | | AFP4-SPH-S014-3 | | | AFP4-SPH-S015-0 | | |
| | 02-MAY-2000 | | | 02-MAY-2000 | | | 02-MAY-2000 | | | 02-MAY-2000 | | |
| | 4-6 | | | 10-12 | | | 12-14 | | | 16-18 | | |
| ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (108) | [100] | ND | (99.6) | [100] | ND | (0.977) | [1] | 22.0 | (98.9) | [100] |
| Benzene | ND | (38.1) | [100] | ND | (35.2) | [100] | ND | (0.345) | [1] | ND | (35.0) | [100] |
| Bromobenzene | ND | (54.0) | [100] | ND | (50.0) | [100] | ND | (0.490) | [1] | ND | (49.6) | [100] |
| Bromochloromethane | ND | (52.6) | [100] | ND | (48.6) | [100] | ND | (0.477) | [1] | ND | (48.3) | [100] |
| Bromodichloromethane | ND | (40.0) | [100] | ND | (37.0) | [100] | ND | (0.363) | [1] | ND | (36.8) | [100] |
| Bromoform | ND | (48.9) | [100] | ND | (45.3) | [100] | ND | (0.444) | [1] | ND | (44.9) | [100] |
| Bromomethane (Methylbromide) | ND | (48.4) | [100] | ND | (44.8) | [100] | ND | (0.440) | [1] | ND | (44.5) | [100] |
| Carbon tetrachloride | ND | (53.7) | [100] | ND | (49.7) | [100] | ND | (0.487) | [1] | ND | (49.3) | [100] |
| Chlorobenzene | ND | (47.9) | [100] | ND | (44.3) | [100] | ND | (0.434) | [1] | ND | (44.0) | [100] |
| Chloroethane | ND | (58.1) | [100] | ND | (53.8) | [100] | ND | (0.527) | [1] | ND | (53.4) | [100] |
| Chloroform | ND | (51.7) | [100] | ND | (47.8) | [100] | ND | (0.469) | [1] | ND | (47.5) | [100] |
| Chloromethane | ND | (55.3) | [100] | ND | (51.2) | [100] | ND | (0.502) | [1] | ND | (50.8) | [100] |
| Dibromochloromethane | ND | (43.5) | [100] | ND | (40.2) | [100] | ND | (0.394) | [1] | ND | (39.9) | [100] |
| Dibromomethane | ND | (52.6) | [100] | ND | (48.6) | [100] | ND | (0.477) | [1] | ND | (48.3) | [100] |
| Dichlorodifluoromethane | ND | (112) | [100] | ND | (103) | [100] | ND | (1.01) | [1] | ND | (102) | [100] |
| Ethylbenzene | ND | (51.7) | [100] | ND | (47.8) | [100] | ND | (0.469) | [1] | ND | (47.5) | [100] |
| Hexachloro-1,3-butadiene | ND | (96.8) | [100] | ND | (89.6) | [100] | ND | (0.878) | [1] | ND | (88.9) | [100] |
| Isopropylbenzene | ND | (59.6) | [100] | ND | (55.1) | [100] | ND | (0.541) | [1] | ND | (54.7) | [100] |
| Methylene chloride | 47.6 | (56.6) | [100] | 47.2 | (52.3) | [100] | ND | (0.513) | [1] | 51.8 | (52.0) | [100] |
| Naphthalene | ND | (48.4) | [100] | ND | (44.8) | [100] | ND | (0.440) | [1] | ND | (44.5) | [100] |
| Styrene | ND | (81.6) | [100] | ND | (75.5) | [100] | ND | (0.741) | [1] | ND | (75.0) | [100] |
| Tetrachloroethene | ND | (77.1) | [100] | ND | (71.4) | [100] | ND | (0.700) | [1] | ND | (70.8) | [100] |
| Toluene | ND | (50.8) | [100] | ND | (47.0) | [100] | ND | (0.461) | [1] | ND | (46.7) | [100] |
| Trichloroethene | 3890 | (42.5) | [100] | 251 | (39.3) | [100] | ND | (0.385) | [1] | 94.6 | (39.0) | [100] |

Compiled: 02/20/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH1

Page: 12

| PARAMETER | SITE ID | | | | | | | | | | | | | | | | | | | |
|---|------------------------------|---|------|-----------------|-------|----|-----------------|------|---|-----------------|----|---|-------|---|-----|----|---|------|---|-------|
| | LOCATION ID | | | | | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | | | | | | | | | |
| | TMP2 | | | TMP2 | | | TMP2 | | | TMP2 | | | | | | | | | | |
| | AFP4-SPH-S012-0 | | | AFP4-SPH-S013-0 | | | AFP4-SPH-S014-3 | | | AFP4-SPH-S015-0 | | | | | | | | | | |
| | 02-MAY-2000 | | | 02-MAY-2000 | | | 02-MAY-2000 | | | 02-MAY-2000 | | | | | | | | | | |
| | 4-6 | | | 10-12 | | | 12-14 | | | 16-18 | | | | | | | | | | |
| ----- | | | | | | | | | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (| 110 |) | [100] | ND | (| 101 |) | [100] | ND | (| 0.994 |) | [1] | ND | (| 101 |) | [100] |
| Vinyl chloride | ND | (| 85.6 |) | [100] | ND | (| 79.2 |) | [100] | ND | (| 0.777 |) | [1] | ND | (| 78.7 |) | [100] |
| cis-1,2-Dichloroethene | ND | (| 55.1 |) | [100] | ND | (| 51.0 |) | [100] | ND | (| 0.500 |) | [1] | ND | (| 50.6 |) | [100] |
| cis-1,3-Dichloropropene | ND | (| 29.1 |) | [100] | ND | (| 26.9 |) | [100] | ND | (| 0.264 |) | [1] | ND | (| 26.7 |) | [100] |
| n-Butylbenzene | ND | (| 116 |) | [100] | ND | (| 108 |) | [100] | ND | (| 1.06 |) | [1] | ND | (| 107 |) | [100] |
| n-Propylbenzene | ND | (| 111 |) | [100] | ND | (| 102 |) | [100] | ND | (| 1.00 |) | [1] | ND | (| 102 |) | [100] |
| o-Xylene | ND | (| 48.6 |) | [100] | ND | (| 45.0 |) | [100] | ND | (| 0.441 |) | [1] | ND | (| 44.7 |) | [100] |
| p-Xylene/m-Xylene | ND | (| 149 |) | [100] | ND | (| 138 |) | [100] | ND | (| 1.35 |) | [1] | ND | (| 137 |) | [100] |
| sec-Butylbenzene | ND | (| 95.7 |) | [100] | ND | (| 88.6 |) | [100] | ND | (| 0.868 |) | [1] | ND | (| 87.9 |) | [100] |
| tert-Butylbenzene | ND | (| 104 |) | [100] | ND | (| 96.0 |) | [100] | ND | (| 0.941 |) | [1] | ND | (| 95.3 |) | [100] |
| trans-1,2-Dichloroethene | ND | (| 61.5 |) | [100] | ND | (| 56.9 |) | [100] | ND | (| 0.558 |) | [1] | ND | (| 56.4 |) | [100] |
| trans-1,3-Dichloropropene | ND | (| 20.9 |) | [100] | ND | (| 19.4 |) | [100] | ND | (| 0.190 |) | [1] | ND | (| 19.2 |) | [100] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 1

| PARAMETER | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | | | | | | | | | | |
|--|---|----|-------|-----------------|-----|-----|-----------------|-------|-------|-----------------|-----|----|-------|-------|-----|-----|----|-------|-------|-----|-----|
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | | | | | | | | | | |
| | TMP2 | | | TMP2 | | | TMP2 | | | TMP2 | | | | | | | | | | | |
| | AFP4-SPH-S016-0 | | | AFP4-SPH-S017-0 | | | AFP4-SPH-S018-0 | | | AFP4-SPH-S019-0 | | | | | | | | | | | |
| | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | | | | | | | | | | |
| | 2-4 | | | 4-6 | | | 10-12 | | | 12-14 | | | | | | | | | | | |
| ----- | | | | | | | | | | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons (ug/kg) | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (| 0.350 |) | [1] | ND | (| 0.347 |) | [1] | ND | (| 0.527 |) | [1] | ND | (| 0.385 |) | [1] | |
| 1,1,1-Trichloroethane | ND | (| 0.222 |) | [1] | ND | (| 0.220 |) | [1] | ND | (| 0.334 |) | [1] | ND | (| 0.244 |) | [1] | |
| 1,1,2,2-Tetrachloroethane | ND | (| 0.423 |) | [1] | ND | (| 0.420 |) | [1] | ND | (| 0.636 |) | [1] | ND | (| 0.465 |) | [1] | |
| 1,1,2-Trichloroethane | ND | (| 0.339 |) | [1] | ND | (| 0.336 |) | [1] | ND | (| 0.510 |) | [1] | ND | (| 0.373 |) | [1] | |
| 1,1-Dichloroethane | ND | UJ | (| 0.353 |) | [1] | ND | (| 0.350 |) | [1] | ND | (| 0.531 |) | [1] | ND | (| 0.388 |) | [1] |
| 1,1-Dichloroethene | ND | (| 0.258 |) | [1] | ND | (| 0.256 |) | [1] | ND | (| 0.389 |) | [1] | ND | (| 0.284 |) | [1] | |
| 1,1-Dichloropropene | ND | (| 0.397 |) | [1] | ND | (| 0.394 |) | [1] | ND | (| 0.597 |) | [1] | ND | (| 0.436 |) | [1] | |
| 1,2,3-Trichlorobenzene | ND | (| 0.579 |) | [1] | ND | (| 0.574 |) | [1] | ND | (| 0.871 |) | [1] | ND | (| 0.637 |) | [1] | |
| 1,2,3-Trichloropropane | ND | (| 0.561 |) | [1] | ND | (| 0.557 |) | [1] | ND | (| 0.845 |) | [1] | ND | (| 0.617 |) | [1] | |
| 1,2,4-Trichlorobenzene | ND | (| 0.624 |) | [1] | ND | (| 0.620 |) | [1] | ND | (| 0.940 |) | [1] | ND | (| 0.687 |) | [1] | |
| 1,2,4-Trimethylbenzene | ND | (| 0.449 |) | [1] | ND | (| 0.445 |) | [1] | ND | (| 0.676 |) | [1] | ND | (| 0.494 |) | [1] | |
| 1,2-Dibromo-3-chloropropane | ND | (| 0.463 |) | [1] | ND | (| 0.459 |) | [1] | ND | (| 0.696 |) | [1] | ND | (| 0.509 |) | [1] | |
| 1,2-Dibromoethane | ND | (| 0.291 |) | [1] | ND | (| 0.289 |) | [1] | ND | (| 0.438 |) | [1] | ND | (| 0.320 |) | [1] | |
| 1,2-Dichlorobenzene | ND | (| 0.299 |) | [1] | ND | (| 0.297 |) | [1] | ND | (| 0.450 |) | [1] | ND | (| 0.329 |) | [1] | |
| 1,2-Dichloroethane | ND | (| 0.252 |) | [1] | ND | (| 0.250 |) | [1] | ND | (| 0.380 |) | [1] | ND | (| 0.277 |) | [1] | |
| 1,2-Dichloropropane | ND | (| 0.291 |) | [1] | ND | (| 0.289 |) | [1] | ND | (| 0.438 |) | [1] | ND | (| 0.320 |) | [1] | |
| 1,3,5-Trimethylbenzene | ND | (| 0.448 |) | [1] | ND | (| 0.445 |) | [1] | ND | (| 0.674 |) | [1] | ND | (| 0.493 |) | [1] | |
| 1,3-Dichlorobenzene | ND | (| 0.412 |) | [1] | ND | (| 0.409 |) | [1] | ND | (| 0.621 |) | [1] | ND | (| 0.454 |) | [1] | |
| 1,3-Dichloropropane | ND | (| 0.131 |) | [1] | ND | (| 0.130 |) | [1] | ND | (| 0.197 |) | [1] | ND | (| 0.144 |) | [1] | |
| 1,4-Dichlorobenzene | ND | (| 0.555 |) | [1] | ND | (| 0.551 |) | [1] | ND | (| 0.836 |) | [1] | ND | (| 0.611 |) | [1] | |
| 1-Chlorohexane | ND | (| 0.487 |) | [1] | ND | (| 0.483 |) | [1] | ND | (| 0.733 |) | [1] | ND | (| 0.536 |) | [1] | |
| 2,2-Dichloropropane | ND | (| 0.333 |) | [1] | ND | (| 0.331 |) | [1] | ND | (| 0.502 |) | [1] | ND | (| 0.367 |) | [1] | |
| 2-Chlorotoluene | ND | (| 0.662 |) | [1] | ND | (| 0.657 |) | [1] | ND | (| 0.996 |) | [1] | ND | (| 0.728 |) | [1] | |
| 4-Chlorotoluene | ND | (| 0.703 |) | [1] | ND | (| 0.698 |) | [1] | ND | (| 1.06 |) | [1] | ND | (| 0.774 |) | [1] | |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 2

| PARAMETER | SITE ID | | | | | | | | | | | |
|---|------------------------------|--------------|-----|-----------------|-----------|-----|-----------------|-----------|-----|-----------------|-----------|-----|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | TMP2 | | | TMP2 | | | TMP2 | | | TMP2 | | |
| | AFP4-SPH-S016-0 | | | AFP4-SPH-S017-0 | | | AFP4-SPH-S018-0 | | | AFP4-SPH-S019-0 | | |
| | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | |
| | 2-4 | | | 4-6 | | | 10-12 | | | 12-14 | | |
| ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (0.608) | [1] | ND | (0.604) | [1] | ND | (0.916) | [1] | ND | (0.669) | [1] |
| Benzene | ND | (0.308) | [1] | ND | (0.306) | [1] | ND | (0.464) | [1] | ND | (0.339) | [1] |
| Bromobenzene | ND | (0.281) | [1] | ND | (0.279) | [1] | ND | (0.424) | [1] | ND | (0.310) | [1] |
| Bromochloromethane | ND | (0.363) | [1] | ND | (0.360) | [1] | ND | (0.546) | [1] | ND | (0.399) | [1] |
| Bromodichloromethane | ND | (0.350) | [1] | ND | (0.347) | [1] | ND | (0.527) | [1] | ND | (0.385) | [1] |
| Bromoform | ND | (0.505) | [1] | ND | (0.501) | [1] | ND | (0.760) | [1] | ND | (0.556) | [1] |
| Bromomethane (Methylbromide) | ND | UJ (0.321) | [1] | ND | (0.319) | [1] | ND | (0.484) | [1] | ND | (0.354) | [1] |
| Carbon tetrachloride | ND | (0.407) | [1] | ND | (0.404) | [1] | ND | (0.613) | [1] | ND | (0.448) | [1] |
| Chlorobenzene | ND | (0.247) | [1] | ND | (0.245) | [1] | ND | (0.372) | [1] | ND | (0.272) | [1] |
| Chloroethane | ND | (0.391) | [1] | ND | (0.388) | [1] | ND | (0.588) | [1] | ND | (0.430) | [1] |
| Chloroform | ND | (0.146) | [1] | ND | (0.145) | [1] | ND | (0.220) | [1] | ND | (0.161) | [1] |
| Chloromethane | ND | (0.699) | [1] | ND | (0.694) | [1] | ND | (1.05) | [1] | ND | (0.769) | [1] |
| Dibromochloromethane | ND | (0.317) | [1] | ND | (0.315) | [1] | ND | (0.477) | [1] | ND | (0.349) | [1] |
| Dibromomethane | ND | (0.283) | [1] | ND | (0.281) | [1] | ND | (0.426) | [1] | ND | (0.312) | [1] |
| Dichlorodifluoromethane | ND | (0.299) | [1] | ND | (0.297) | [1] | ND | (0.450) | [1] | ND | (0.329) | [1] |
| Ethylbenzene | ND | (0.364) | [1] | ND | (0.361) | [1] | ND | (0.548) | [1] | ND | (0.400) | [1] |
| Hexachloro-1,3-butadiene | ND | (0.816) | [1] | ND | (0.810) | [1] | ND | (1.23) | [1] | ND | (0.898) | [1] |
| Isopropylbenzene | ND | (0.394) | [1] | ND | (0.391) | [1] | ND | (0.593) | [1] | ND | (0.434) | [1] |
| Methylene chloride | ND | (0.234) | [1] | ND | (0.232) | [1] | ND | (0.352) | [1] | ND | (0.257) | [1] |
| Naphthalene | ND | (0.487) | [1] | ND | (0.483) | [1] | ND | (0.733) | [1] | ND | (0.536) | [1] |
| Styrene | ND | (0.294) | [1] | ND | (0.292) | [1] | ND | (0.442) | [1] | ND | (0.323) | [1] |
| Tetrachloroethene | ND | (0.416) | [1] | ND | (0.413) | [1] | ND | (0.626) | [1] | ND | (0.457) | [1] |
| Toluene | ND | (0.264) | [1] | ND | (0.262) | [1] | ND | (0.398) | [1] | ND | (0.291) | [1] |
| Trichloroethene | ND | (0.368) | [1] | 38.2 | (0.365) | [1] | ND | (0.554) | [1] | ND | (0.405) | [1] |

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

TABLE 3

| PARAMETER | SITE ID | | | | | | | | | | | | | | | | | | | | |
|---|------------------------------|----|-------|-------|-----------------|-----|----|-------|-----------------|-----|-----|----|-----------------|-------|-----|-----|----|-------|-------|-----|-----|
| | LOCATION ID | | | | | | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | | | | | | | | | | |
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | | | | | |
| | TMP2 | | | | TMP2 | | | | TMP2 | | | | TMP2 | | | | | | | | |
| | AFP4-SPH-S016-0 | | | | AFP4-SPH-S017-0 | | | | AFP4-SPH-S018-0 | | | | AFP4-SPH-S019-0 | | | | | | | | |
| | 20-NOV-2000 | | | | 20-NOV-2000 | | | | 20-NOV-2000 | | | | 20-NOV-2000 | | | | | | | | |
| | 2-4 | | | | 4-6 | | | | 10-12 | | | | 12-14 | | | | | | | | |
| ----- | | | | | | | | | | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (| 0.340 |) | [1] | ND | (| 0.338 |) | [1] | ND | (| 0.513 |) | [1] | ND | (| 0.374 |) | [1] | |
| Vinyl chloride | ND | (| 0.313 |) | [1] | ND | (| 0.310 |) | [1] | ND | (| 0.471 |) | [1] | ND | (| 0.344 |) | [1] | |
| cis-1,2-Dichloroethene | ND | (| 0.240 |) | [1] | ND | (| 0.238 |) | [1] | ND | (| 0.361 |) | [1] | ND | (| 0.264 |) | [1] | |
| cis-1,3-Dichloropropene | ND | (| 0.279 |) | [1] | ND | (| 0.277 |) | [1] | ND | (| 0.420 |) | [1] | ND | (| 0.307 |) | [1] | |
| n-Butylbenzene | ND | (| 0.721 |) | [1] | ND | (| 0.716 |) | [1] | ND | (| 1.09 |) | [1] | ND | (| 0.793 |) | [1] | |
| n-Propylbenzene | ND | (| 0.640 |) | [1] | ND | (| 0.636 |) | [1] | ND | (| 0.964 |) | [1] | ND | (| 0.704 |) | [1] | |
| o-Xylene | ND | (| 0.406 |) | [1] | ND | (| 0.403 |) | [1] | ND | (| 0.612 |) | [1] | ND | (| 0.447 |) | [1] | |
| p-Xylene/m-Xylene | ND | (| 0.693 |) | [1] | ND | (| 0.688 |) | [1] | ND | (| 1.04 |) | [1] | ND | (| 0.762 |) | [1] | |
| sec-Butylbenzene | ND | (| 0.539 |) | [1] | ND | (| 0.535 |) | [1] | ND | (| 0.811 |) | [1] | ND | (| 0.593 |) | [1] | |
| tert-Butylbenzene | ND | (| 0.435 |) | [1] | ND | (| 0.432 |) | [1] | ND | (| 0.655 |) | [1] | ND | (| 0.478 |) | [1] | |
| trans-1,2-Dichloroethene | ND | UJ | (| 0.282 |) | [1] | ND | (| 0.280 |) | [1] | ND | (| 0.425 |) | [1] | ND | (| 0.311 |) | [1] |
| trans-1,3-Dichloropropene | ND | (| 0.388 |) | [1] | ND | (| 0.385 |) | [1] | ND | (| 0.584 |) | [1] | ND | (| 0.427 |) | [1] | |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 4

| PARAMETER | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
|--|---|---------|-------|--|---------|-------|--|---------|-------|--|---------|-------|
| | Bldg181 TMP2 AFP4-SPH-S020-3 20-NOV-2000 16-18 | | | Bldg181 TMP3 AFP4-SPH-S021-0 20-NOV-2000 2-4 | | | Bldg181 TMP3 AFP4-SPH-S022-0 20-NOV-2000 6-8 | | | Bldg181 TMP3 AFP4-SPH-S023-0 20-NOV-2000 24-26 | | |
| | <hr/> | | | | | | | | | | | |
| | <hr/> | | | | | | | | | | | |
| | <hr/> | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons (ug/kg) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (0.379 |) [1] | ND | (0.466 |) [1] | ND | (0.455 |) [1] | ND | (0.445 |) [1] |
| 1,1,1-Trichloroethane | ND | (0.240 |) [1] | ND | (0.295 |) [1] | ND | (0.288 |) [1] | ND | (0.282 |) [1] |
| 1,1,2,2-Tetrachloroethane | ND | (0.458 |) [1] | ND | (0.562 |) [1] | ND | (0.549 |) [1] | ND | (0.537 |) [1] |
| 1,1,2-Trichloroethane | ND | (0.367 |) [1] | ND | (0.451 |) [1] | ND | (0.440 |) [1] | ND | (0.430 |) [1] |
| 1,1-Dichloroethane | ND | (0.382 |) [1] | ND | (0.469 |) [1] | ND | (0.458 |) [1] | ND | (0.448 |) [1] |
| 1,1-Dichloroethene | ND | (0.280 |) [1] | ND | (0.343 |) [1] | ND | (0.335 |) [1] | ND | (0.328 |) [1] |
| 1,1-Dichloropropene | ND | (0.430 |) [1] | ND | (0.528 |) [1] | ND | (0.515 |) [1] | ND | (0.504 |) [1] |
| 1,2,3-Trichlorobenzene | ND | (0.627 |) [1] | ND | (0.770 |) [1] | ND | (0.752 |) [1] | ND | (0.735 |) [1] |
| 1,2,3-Trichloropropane | ND | (0.608 |) [1] | ND | (0.747 |) [1] | ND | (0.729 |) [1] | ND | (0.713 |) [1] |
| 1,2,4-Trichlorobenzene | ND | (0.677 |) [1] | ND | (0.831 |) [1] | ND | (0.811 |) [1] | ND | (0.794 |) [1] |
| 1,2,4-Trimethylbenzene | ND | (0.486 |) [1] | ND | (0.597 |) [1] | ND | (0.583 |) [1] | ND | (0.570 |) [1] |
| 1,2-Dibromo-3-chloropropane | ND | (0.501 |) [1] | ND | (0.615 |) [1] | ND | (0.601 |) [1] | ND | (0.588 |) [1] |
| 1,2-Dibromoethane | ND | (0.315 |) [1] | ND | (0.387 |) [1] | ND | (0.378 |) [1] | ND | (0.370 |) [1] |
| 1,2-Dichlorobenzene | ND | (0.324 |) [1] | ND | (0.398 |) [1] | ND | (0.388 |) [1] | ND | (0.380 |) [1] |
| 1,2-Dichloroethane | ND | (0.273 |) [1] | ND | (0.335 |) [1] | ND | (0.327 |) [1] | ND | (0.320 |) [1] |
| 1,2-Dichloropropane | ND | (0.315 |) [1] | ND | (0.387 |) [1] | ND | (0.378 |) [1] | ND | (0.370 |) [1] |
| 1,3,5-Trimethylbenzene | ND | (0.485 |) [1] | ND | (0.596 |) [1] | ND | (0.582 |) [1] | ND | (0.569 |) [1] |
| 1,3-Dichlorobenzene | ND | (0.447 |) [1] | ND | (0.548 |) [1] | ND | (0.536 |) [1] | ND | (0.524 |) [1] |
| 1,3-Dichloropropane | ND | (0.142 |) [1] | ND | (0.174 |) [1] | ND | (0.170 |) [1] | ND | (0.166 |) [1] |
| 1,4-Dichlorobenzene | ND | (0.602 |) [1] | ND | (0.739 |) [1] | ND | (0.721 |) [1] | ND | (0.705 |) [1] |
| 1-Chlorohexane | ND | (0.527 |) [1] | ND | (0.648 |) [1] | ND | (0.632 |) [1] | ND | (0.619 |) [1] |
| 2,2-Dichloropropane | ND | (0.361 |) [1] | ND | (0.444 |) [1] | ND | (0.433 |) [1] | ND | (0.424 |) [1] |
| 2-Chlorotoluene | ND | (0.717 |) [1] | ND | (0.880 |) [1] | ND | (0.860 |) [1] | ND | (0.841 |) [1] |
| 4-Chlorotoluene | ND | (0.762 |) [1] | ND | (0.936 |) [1] | ND | (0.914 |) [1] | ND | (0.894 |) [1] |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 5

| PARAMETER | SITE ID | | | | | | | | | | | | | | | | | | | |
|---|--|---|-------|---|--|------|---|-------|--|-----|------|---|--|---|-----|----|---|-------|---|-----|
| | LOCATION ID | | | | | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | | | | | | | | | |
| | Bldg181 TMP2 AFP4-SPH-S020-3 20-NOV-2000 16-18 | | | | Bldg181 TMP3 AFP4-SPH-S021-0 20-NOV-2000 2-4 | | | | Bldg181 TMP3 AFP4-SPH-S022-0 20-NOV-2000 6-8 | | | | Bldg181 TMP3 AFP4-SPH-S023-0 20-NOV-2000 24-26 | | | | | | | |
| ----- | ----- | | | | ----- | | | | ----- | | | | ----- | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (| 0.659 |) | [1] | ND | (| 0.809 |) | [1] | ND | (| 0.790 |) | [1] | ND | (| 0.773 |) | [1] |
| Benzene | ND | (| 0.334 |) | [1] | ND | (| 0.410 |) | [1] | ND | (| 0.401 |) | [1] | ND | (| 0.392 |) | [1] |
| Bromobenzene | ND | (| 0.305 |) | [1] | ND | (| 0.374 |) | [1] | ND | (| 0.366 |) | [1] | ND | (| 0.358 |) | [1] |
| Bromochloromethane | ND | (| 0.393 |) | [1] | ND | (| 0.483 |) | [1] | ND | (| 0.472 |) | [1] | ND | (| 0.461 |) | [1] |
| Bromodichloromethane | ND | (| 0.379 |) | [1] | ND | (| 0.466 |) | [1] | ND | (| 0.455 |) | [1] | ND | (| 0.445 |) | [1] |
| Bromoform | ND | (| 0.547 |) | [1] | ND | (| 0.672 |) | [1] | ND | (| 0.656 |) | [1] | ND | (| 0.642 |) | [1] |
| Bromomethane (Methylbromide) | ND | (| 0.348 |) | [1] | ND | (| 0.427 |) | [1] | ND | (| 0.418 |) | [1] | ND | (| 0.408 |) | [1] |
| Carbon tetrachloride | ND | (| 0.441 |) | [1] | ND | (| 0.542 |) | [1] | ND | (| 0.529 |) | [1] | ND | (| 0.517 |) | [1] |
| Chlorobenzene | ND | (| 0.267 |) | [1] | ND | (| 0.328 |) | [1] | ND | (| 0.321 |) | [1] | ND | (| 0.314 |) | [1] |
| Chloroethane | ND | (| 0.423 |) | [1] | ND | (| 0.520 |) | [1] | ND | (| 0.508 |) | [1] | ND | (| 0.496 |) | [1] |
| Chloroform | ND | (| 0.159 |) | [1] | ND | (| 0.195 |) | [1] | ND | (| 0.190 |) | [1] | ND | (| 0.186 |) | [1] |
| Chloromethane | ND | (| 0.757 |) | [1] | ND | (| 0.930 |) | [1] | ND | (| 0.908 |) | [1] | ND | (| 0.888 |) | [1] |
| Dibromochloromethane | ND | (| 0.344 |) | [1] | ND | (| 0.422 |) | [1] | ND | (| 0.412 |) | [1] | ND | (| 0.403 |) | [1] |
| Dibromomethane | ND | (| 0.307 |) | [1] | ND | (| 0.377 |) | [1] | ND | (| 0.368 |) | [1] | ND | (| 0.360 |) | [1] |
| Dichlorodifluoromethane | ND | (| 0.324 |) | [1] | ND | (| 0.398 |) | [1] | ND | (| 0.388 |) | [1] | ND | (| 0.380 |) | [1] |
| Ethylbenzene | ND | (| 0.394 |) | [1] | ND | (| 0.484 |) | [1] | ND | (| 0.473 |) | [1] | ND | (| 0.462 |) | [1] |
| Hexachloro-1,3-butadiene | ND | (| 0.884 |) | [1] | ND | (| 1.09 |) | [1] | ND | (| 1.06 |) | [1] | ND | (| 1.04 |) | [1] |
| Isopropylbenzene | ND | (| 0.427 |) | [1] | ND | (| 0.524 |) | [1] | ND | (| 0.512 |) | [1] | ND | (| 0.501 |) | [1] |
| Methylene chloride | ND | (| 0.253 |) | [1] | ND | (| 0.311 |) | [1] | ND | (| 0.304 |) | [1] | ND | (| 0.297 |) | [1] |
| Naphthalene | ND | (| 0.527 |) | [1] | ND | (| 0.648 |) | [1] | ND | (| 0.632 |) | [1] | ND | (| 0.619 |) | [1] |
| Styrene | ND | (| 0.318 |) | [1] | ND | (| 0.391 |) | [1] | ND | (| 0.382 |) | [1] | ND | (| 0.373 |) | [1] |
| Tetrachloroethene | ND | (| 0.451 |) | [1] | ND | (| 0.553 |) | [1] | ND | (| 0.540 |) | [1] | ND | (| 0.528 |) | [1] |
| Toluene | ND | (| 0.286 |) | [1] | 5.03 | (| 0.351 |) | [1] | 5.21 | (| 0.343 |) | [1] | ND | (| 0.336 |) | [1] |
| Trichloroethene | ND | (| 0.399 |) | [1] | ND | (| 0.490 |) | [1] | ND | (| 0.478 |) | [1] | ND | (| 0.468 |) | [1] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 6

| PARAMETER | SITE ID | | | | | | | | | | | | | | |
|---|------------------------------|---|-------|-----------------|-----|----|-----------------|-------|---|-----------------|----|---|-------|---|-----|
| | LOCATION ID | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | | | | |
| | TMP2 | | | TMP3 | | | TMP3 | | | TMP3 | | | | | |
| | AFP4-SPH-S020-3 | | | AFP4-SPH-S021-0 | | | AFP4-SPH-S022-0 | | | AFP4-SPH-S023-0 | | | | | |
| | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | | | | |
| | 16-18 | | | 2-4 | | | 6-8 | | | 24-26 | | | | | |
| ----- | ----- | | | ----- | | | ----- | | | ----- | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (| 0.369 |) | [1] | ND | (| 0.453 |) | [1] | ND | (| 0.433 |) | [1] |
| Vinyl chloride | ND | (| 0.339 |) | [1] | ND | (| 0.416 |) | [1] | ND | (| 0.397 |) | [1] |
| cis-1,2-Dichloroethene | ND | (| 0.260 |) | [1] | ND | (| 0.319 |) | [1] | ND | (| 0.305 |) | [1] |
| cis-1,3-Dichloropropene | ND | (| 0.302 |) | [1] | ND | (| 0.371 |) | [1] | ND | (| 0.354 |) | [1] |
| n-Butylbenzene | ND | (| 0.781 |) | [1] | ND | (| 0.959 |) | [1] | ND | (| 0.916 |) | [1] |
| n-Propylbenzene | ND | (| 0.694 |) | [1] | ND | (| 0.852 |) | [1] | ND | (| 0.813 |) | [1] |
| o-Xylene | ND | (| 0.440 |) | [1] | ND | (| 0.540 |) | [1] | ND | (| 0.516 |) | [1] |
| p-Xylene/m-Xylene | ND | (| 0.751 |) | [1] | ND | (| 0.922 |) | [1] | ND | (| 0.880 |) | [1] |
| sec-Butylbenzene | ND | (| 0.584 |) | [1] | ND | (| 0.717 |) | [1] | ND | (| 0.685 |) | [1] |
| tert-Butylbenzene | ND | (| 0.471 |) | [1] | ND | (| 0.578 |) | [1] | ND | (| 0.552 |) | [1] |
| trans-1,2-Dichloroethene | ND | (| 0.306 |) | [1] | ND | (| 0.376 |) | [1] | ND | (| 0.359 |) | [1] |
| trans-1,3-Dichloropropene | ND | (| 0.420 |) | [1] | ND | (| 0.516 |) | [1] | ND | (| 0.493 |) | [1] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 7

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|------------------------------|-----------|-----|-----------------|-----------|-----|---|-----------|-----|-----------------|-----------|-----|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | |
| | TMP3 | | | TMP3 | | | TMP3 | | | TMP1 | | |
| | AFP4-SPH-S024-0 | | | AFP4-SPH-S025-0 | | | AFP4-SPH-S025-1 Dup of AFP4-SPH-S025-0 | | | AFP4-SPH-S027-0 | | |
| | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | |
| | 28-30 | | | 30-32 | | | 30-32 | | | 4-6 | | |
| ----- | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons (ug/kg) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (0.458) | [1] | ND | (0.411) | [1] | ND | (0.376) | [1] | ND | (0.359) | [1] |
| 1,1,1-Trichloroethane | ND | (0.290) | [1] | ND | (0.260) | [1] | ND | (0.238) | [1] | ND | (0.228) | [1] |
| 1,1,2,2-Tetrachloroethane | ND | (0.553) | [1] | ND | (0.496) | [1] | ND | (0.455) | [1] | ND | (0.434) | [1] |
| 1,1,2-Trichloroethane | ND | (0.443) | [1] | ND | (0.397) | [1] | ND | (0.364) | [1] | ND | (0.347) | [1] |
| 1,1-Dichloroethane | ND | (0.461) | [1] | ND | (0.414) | [1] | ND | (0.379) | [1] | ND | (0.362) | [1] |
| 1,1-Dichloroethene | ND | (0.338) | [1] | ND | (0.303) | [1] | ND | (0.278) | [1] | ND | (0.265) | [1] |
| 1,1-Dichloropropene | ND | (0.519) | [1] | ND | (0.465) | [1] | ND | (0.427) | [1] | ND | (0.407) | [1] |
| 1,2,3-Trichlorobenzene | ND | (0.757) | [1] | ND | (0.679) | [1] | ND | (0.622) | [1] | ND | (0.594) | [1] |
| 1,2,3-Trichloropropane | ND | (0.734) | [1] | ND | (0.658) | [1] | ND | (0.604) | [1] | ND | (0.576) | [1] |
| 1,2,4-Trichlorobenzene | ND | (0.817) | [1] | ND | (0.733) | [1] | ND | (0.672) | [1] | ND | (0.641) | [1] |
| 1,2,4-Trimethylbenzene | 7.50 | (3.15) | [1] | ND | (0.526) | [1] | ND | (0.483) | [1] | 10.1 | (2.74) | [1] |
| 1,2-Dibromo-3-chloropropane | ND | (0.605) | [1] | ND | (0.543) | [1] | ND | (0.497) | [1] | ND | (0.475) | [1] |
| 1,2-Dibromoethane | ND | (0.381) | [1] | ND | (0.341) | [1] | ND | (0.313) | [1] | ND | (0.299) | [1] |
| 1,2-Dichlorobenzene | ND | (0.391) | [1] | ND | (0.351) | [1] | ND | (0.321) | [1] | ND | (0.307) | [1] |
| 1,2-Dichloroethane | ND | (0.330) | [1] | ND | (0.296) | [1] | ND | (0.271) | [1] | ND | (0.259) | [1] |
| 1,2-Dichloropropane | ND | (0.381) | [1] | ND | (0.341) | [1] | ND | (0.313) | [1] | ND | (0.299) | [1] |
| 1,3,5-Trimethylbenzene | ND | (0.586) | [1] | ND | (0.525) | [1] | ND | (0.482) | [1] | ND | (0.459) | [1] |
| 1,3-Dichlorobenzene | ND | (0.539) | [1] | ND | (0.484) | [1] | ND | (0.443) | [1] | ND | (0.423) | [1] |
| 1,3-Dichloropropane | ND | (0.171) | [1] | ND | (0.153) | [1] | ND | (0.141) | [1] | ND | (0.134) | [1] |
| 1,4-Dichlorobenzene | ND | (0.726) | [1] | ND | (0.651) | [1] | ND | (0.597) | [1] | ND | (0.570) | [1] |
| 1-Chlorohexane | ND | (0.637) | [1] | ND | (0.571) | [1] | ND | (0.524) | [1] | ND | (0.499) | [1] |
| 2,2-Dichloropropane | ND | (0.436) | [1] | ND | (0.391) | [1] | ND | (0.359) | [1] | ND | (0.342) | [1] |
| 2-Chlorotoluene | ND | (0.865) | [1] | ND | (0.776) | [1] | ND | (0.712) | [1] | ND | (0.679) | [1] |
| 4-Chlorotoluene | ND | (0.920) | [1] | ND | (0.825) | [1] | ND | (0.756) | [1] | ND | (0.722) | [1] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 8

| PARAMETER | SITE ID | | | | | | | | | | | | | | | | | | | | | | | |
|---|------------------------------|---|-------|-----------------|-----|------|---|-------|---|-----------------|------|-----|-------|---|-----|-------|---|-------|-----|-----|------|-------|-----|-----|
| | LOCATION ID | | | | | | | | | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | Bldg181 | | | Bldg181 | | | Bldg181 | | | Bldg181 | | | | | | | | | | | | | | |
| | TMP3 | | | TMP3 | | | TMP3 | | | TMP1 | | | | | | | | | | | | | | |
| | AFP4-SPH-S024-0 | | | AFP4-SPH-S025-0 | | | AFP4-SPH-S025-1 Dup of AFP4-SPH-S025-0 | | | AFP4-SPH-S027-0 | | | | | | | | | | | | | | |
| | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | | 20-NOV-2000 | | | | | | | | | | | | | | |
| | 28-30 | | | 30-32 | | | 30-32 | | | 4-6 | | | | | | | | | | | | | | |
| ----- | | | | | | | | | | | | | | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (| 0.795 |) | [1] | ND | (| 0.713 |) | [1] | ND | (| 0.654 |) | [1] | ND | (| 0.624 |) | [1] | | | | |
| Benzene | 6.09 | (| 0.403 |) | [1] | 10.5 | (| 2.04 |) | [1] | 9.91 | (| 2.02 |) | [1] | 19.0 | (| 1.88 |) | [1] | | | | |
| Bromobenzene | ND | (| 0.368 |) | [1] | ND | (| 0.330 |) | [1] | ND | (| 0.303 |) | [1] | ND | (| 0.289 |) | [1] | | | | |
| Bromochloromethane | ND | (| 0.475 |) | [1] | ND | (| 0.426 |) | [1] | ND | (| 0.390 |) | [1] | ND | (| 0.372 |) | [1] | | | | |
| Bromodichloromethane | ND | (| 0.458 |) | [1] | ND | (| 0.411 |) | [1] | ND | (| 0.376 |) | [1] | ND | (| 0.359 |) | [1] | | | | |
| Bromoform | ND | (| 0.660 |) | [1] | ND | (| 0.592 |) | [1] | ND | (| 0.543 |) | [1] | ND | (| 0.518 |) | [1] | | | | |
| Bromomethane (Methylbromide) | ND | (| 0.420 |) | [1] | ND | (| 0.377 |) | [1] | ND | (| 0.346 |) | [1] | ND | (| 0.330 |) | [1] | | | | |
| Carbon tetrachloride | ND | (| 0.532 |) | [1] | ND | (| 0.478 |) | [1] | ND | (| 0.438 |) | [1] | ND | (| 0.418 |) | [1] | | | | |
| Chlorobenzene | ND | (| 0.323 |) | [1] | ND | (| 0.290 |) | [1] | ND | (| 0.265 |) | [1] | ND | (| 0.253 |) | [1] | | | | |
| Chloroethane | ND | (| 0.511 |) | [1] | ND | (| 0.458 |) | [1] | ND | (| 0.420 |) | [1] | ND | (| 0.401 |) | [1] | | | | |
| Chloroform | ND | (| 0.191 |) | [1] | ND | (| 0.172 |) | [1] | ND | (| 0.157 |) | [1] | ND | (| 0.150 |) | [1] | | | | |
| Chloromethane | ND | (| 0.914 |) | [1] | ND | (| 0.820 |) | [1] | ND | (| 0.752 |) | [1] | ND | (| 0.717 |) | [1] | | | | |
| Dibromochloromethane | ND | (| 0.415 |) | [1] | ND | (| 0.372 |) | [1] | ND | (| 0.341 |) | [1] | ND | (| 0.325 |) | [1] | | | | |
| Dibromomethane | ND | (| 0.370 |) | [1] | ND | (| 0.332 |) | [1] | ND | (| 0.305 |) | [1] | ND | (| 0.291 |) | [1] | | | | |
| Dichlorodifluoromethane | ND | (| 0.391 |) | [1] | ND | (| 0.351 |) | [1] | ND | (| 0.321 |) | [1] | ND | (| 0.307 |) | [1] | | | | |
| Ethylbenzene | 20.6 | (| 2.55 |) | [1] | 12.5 | (| 2.41 |) | [1] | 13.9 | (| 2.38 |) | [1] | 48.0 | (| 2.22 |) | [1] | | | | |
| Hexachloro-1,3-butadiene | ND | (| 1.07 |) | [1] | ND | (| 0.957 |) | [1] | ND | (| 0.877 |) | [1] | ND | (| 0.837 |) | [1] | | | | |
| Isopropylbenzene | ND | (| 0.515 |) | [1] | ND | (| 0.462 |) | [1] | ND | (| 0.424 |) | [1] | ND | (| 0.404 |) | [1] | | | | |
| Methylene chloride | ND | B | (| 1.64 |) | [1] | ND | B | (| 1.55 |) | [1] | ND | B | (| 1.53 |) | [1] | ND | (| 1.43 |) | [1] | |
| Naphthalene | ND | (| 0.637 |) | [1] | ND | (| 0.571 |) | [1] | ND | (| 0.524 |) | [1] | 5.46 | (| 0.499 |) | [1] | | | | |
| Styrene | ND | (| 0.384 |) | [1] | ND | (| 0.344 |) | [1] | ND | (| 0.316 |) | [1] | ND | (| 0.301 |) | [1] | | | | |
| Tetrachloroethene | ND | (| 0.544 |) | [1] | ND | (| 0.488 |) | [1] | ND | (| 0.447 |) | [1] | ND | (| 0.427 |) | [1] | | | | |
| Toluene | 8.33 | (| 0.345 |) | [1] | ND | (| 0.310 |) | [1] | ND | (| 0.284 |) | [1] | 58.4 | (| 1.61 |) | [1] | | | | |
| Trichloroethene | 932 | E | (| 0.481 |) | [1] | 1010 | E | (| 0.432 |) | [1] | 288 | E | (| 0.396 |) | [1] | 269 | E | (| 0.378 |) | [1] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 9

| | SITE ID LOCATION ID SAMPLE ID DATE SAMPLED BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
|---|---|---------|-------|------------------------------------|---------|-------|--|---------|-------|------------------------------------|---------|-------|
| | Bldg181 TMP3 AFP4-SPH-S024-0 | | | Bldg181 TMP3 AFP4-SPH-S025-0 | | | Bldg181 TMP3 AFP4-SPH-S025-1 Dup of AFP4-SPH-S025-0 | | | Bldg181 TMP1 AFP4-SPH-S027-0 | | |
| PARAMETER | 20-NOV-2000 28-30 | | | 20-NOV-2000 30-32 | | | 20-NOV-2000 30-32 | | | 20-NOV-2000 4-6 | | |
| ----- | ----- | | | | | | | | | | | |
| SW82608 - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (0.445 |) [1] | ND | (0.399 |) [1] | ND | (0.366 |) [1] | ND | (0.349 |) [1] |
| Vinyl chloride | ND | (0.409 |) [1] | ND | (0.367 |) [1] | ND | (0.336 |) [1] | ND | (0.321 |) [1] |
| cis-1,2-Dichloroethene | ND | (0.314 |) [1] | ND | (0.281 |) [1] | ND | (0.258 |) [1] | ND | (0.246 |) [1] |
| cis-1,3-Dichloropropene | ND | (0.365 |) [1] | ND | (0.327 |) [1] | ND | (0.300 |) [1] | ND | (0.286 |) [1] |
| n-Butylbenzene | ND | (0.942 |) [1] | ND | (0.845 |) [1] | ND | (0.775 |) [1] | 6.15 | (4.39 |) [1] |
| n-Propylbenzene | 5.03 | (4.50 |) [1] | ND | (0.751 |) [1] | ND | (0.688 |) [1] | 8.08 | (3.90 |) [1] |
| o-Xylene | 6.54 | (2.85 |) [1] | ND | (0.477 |) [1] | ND | (0.437 |) [1] | 7.10 | (2.48 |) [1] |
| p-Xylene/m-Xylene | 12.5 | (4.87 |) [1] | ND | (0.813 |) [1] | ND | (0.745 |) [1] | 13.3 | (4.23 |) [1] |
| sec-Butylbenzene | ND | (0.705 |) [1] | ND | (0.632 |) [1] | ND | (0.579 |) [1] | ND | (0.553 |) [1] |
| tert-Butylbenzene | ND | (0.569 |) [1] | ND | (0.510 |) [1] | ND | (0.468 |) [1] | ND | (0.446 |) [1] |
| trans-1,2-Dichloroethene | ND | (0.369 |) [1] | ND | (0.331 |) [1] | ND | (0.304 |) [1] | ND | (0.290 |) [1] |
| trans-1,3-Dichloropropene | ND | (0.507 |) [1] | ND | (0.455 |) [1] | ND | (0.417 |) [1] | ND | (0.398 |) [1] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 10

| PARAMETER | SITE ID | | | | | | | | | | | |
|--|--|-----------|-----|--|-----------|-----|--|-----------|-----|--|-----------|-----|
| | LOCATION ID | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | |
| | ----- | | | | | | | | | | | |
| | Bldg181 TMP1 AFP4-SPH-S027-1 Dup of AFP4-SPH-S027-0 20-NOV-2000 4-6 | | | Bldg181 TMP1 AFP4-SPH-S029-0 20-NOV-2000 6-8 | | | Bldg181 TMP1 AFP4-SPH-S030-0 20-NOV-2000 14-16 | | | Bldg181 TMP1 AFP4-SPH-S031-0 20-NOV-2000 24-26 | | |
| | ----- | | | | | | | | | | | |
| SW8260B - Volatile Organic Carbons (ug/kg) | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | ND | (0.377) | [1] | ND | (0.349) | [1] | ND | (0.367) | [1] | ND | (0.417) | [1] |
| 1,1,1-Trichloroethane | ND | (0.239) | [1] | ND | (0.221) | [1] | ND | (0.233) | [1] | ND | (0.264) | [1] |
| 1,1,2,2-Tetrachloroethane | ND | (0.456) | [1] | ND | (0.422) | [1] | ND | (0.444) | [1] | ND | (0.504) | [1] |
| 1,1,2-Trichloroethane | ND | (0.365) | [1] | ND | (0.338) | [1] | ND | (0.356) | [1] | ND | (0.404) | [1] |
| 1,1-Dichloroethane | ND | (0.380) | [1] | ND | (0.352) | [1] | ND | (0.370) | [1] | ND | (0.420) | [1] |
| 1,1-Dichloroethene | ND | (0.278) | [1] | ND | (0.258) | [1] | ND | (0.271) | [1] | ND | (0.308) | [1] |
| 1,1-Dichloropropene | ND | (0.428) | [1] | ND | (0.396) | [1] | ND | (0.417) | [1] | ND | (0.473) | [1] |
| 1,2,3-Trichlorobenzene | ND | (0.624) | [1] | ND | (0.577) | [1] | ND | (0.608) | [1] | ND | (0.690) | [1] |
| 1,2,3-Trichloropropane | ND | (0.605) | [1] | ND | (0.560) | [1] | ND | (0.589) | [1] | ND | (0.669) | [1] |
| 1,2,4-Trichlorobenzene | ND | (0.674) | [1] | ND | (0.623) | [1] | ND | (0.656) | [1] | ND | (0.745) | [1] |
| 1,2,4-Trimethylbenzene | 11.7 | (2.77) | [1] | ND | (0.448) | [1] | ND | (0.471) | [1] | ND | (0.535) | [1] |
| 1,2-Dibromo-3-chloropropane | ND | (0.499) | [1] | ND | (0.461) | [1] | ND | (0.486) | [1] | ND | (0.552) | [1] |
| 1,2-Dibromoethane | ND | (0.314) | [1] | ND | (0.290) | [1] | ND | (0.306) | [1] | ND | (0.347) | [1] |
| 1,2-Dichlorobenzene | ND | (0.322) | [1] | ND | (0.298) | [1] | ND | (0.314) | [1] | ND | (0.356) | [1] |
| 1,2-Dichloroethane | ND | (0.272) | [1] | ND | (0.251) | [1] | ND | (0.265) | [1] | ND | (0.301) | [1] |
| 1,2-Dichloropropane | ND | (0.314) | [1] | ND | (0.290) | [1] | ND | (0.306) | [1] | ND | (0.347) | [1] |
| 1,3,5-Trimethylbenzene | ND | (0.483) | [1] | ND | (0.447) | [1] | ND | (0.470) | [1] | ND | (0.534) | [1] |
| 1,3-Dichlorobenzene | ND | (0.445) | [1] | ND | (0.411) | [1] | ND | (0.433) | [1] | ND | (0.492) | [1] |
| 1,3-Dichloropropane | ND | (0.141) | [1] | ND | (0.130) | [1] | ND | (0.137) | [1] | ND | (0.156) | [1] |
| 1,4-Dichlorobenzene | ND | (0.599) | [1] | ND | (0.554) | [1] | ND | (0.583) | [1] | ND | (0.662) | [1] |
| 1-Chlorohexane | ND | (0.525) | [1] | ND | (0.486) | [1] | ND | (0.511) | [1] | ND | (0.580) | [1] |
| 2,2-Dichloropropane | ND | (0.360) | [1] | ND | (0.333) | [1] | ND | (0.350) | [1] | ND | (0.398) | [1] |
| 2-Chlorotoluene | ND | (0.714) | [1] | ND | (0.660) | [1] | ND | (0.695) | [1] | ND | (0.789) | [1] |
| 4-Chlorotoluene | ND | (0.759) | [1] | ND | (0.702) | [1] | ND | (0.739) | [1] | ND | (0.839) | [1] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 11

| SITE ID LOCATION ID SAMPLE ID DATE SAMPLED BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | | | | | |
|---|-------|-------------|-----|--|-----------|-----|-------|--|-----|-------|-----------|--|--|--|--|
| Bldg181 TMP1 AFP4-SPH-S027-1 Dup of AFP4-SPH-S027-0 20-NOV-2000 4-6 | | | | Bldg181 TMP1 AFP4-SPH-S029-0 20-NOV-2000 6-8 | | | | Bldg181 TMP1 AFP4-SPH-S030-0 20-NOV-2000 14-16 | | | | Bldg181 TMP1 AFP4-SPH-S031-0 20-NOV-2000 24-26 | | | |
| PARAMETER | ----- | | | ----- | | | ----- | | | ----- | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | | | | |
| 4-Isopropyltoluene | ND | (0.656) | [1] | ND | (0.607) | [1] | ND | (0.638) | [1] | ND | (0.725) | [1] | | | |
| Benzene | 22.6 | (1.90) | [1] | ND | (0.308) | [1] | ND | (0.324) | [1] | ND | (0.368) | [1] | | | |
| Bromobenzene | ND | (0.304) | [1] | ND | (0.281) | [1] | ND | (0.296) | [1] | ND | (0.336) | [1] | | | |
| Bromochloromethane | ND | (0.391) | [1] | ND | (0.362) | [1] | ND | (0.381) | [1] | ND | (0.433) | [1] | | | |
| Bromodichloromethane | ND | (0.377) | [1] | ND | (0.349) | [1] | ND | (0.367) | [1] | ND | (0.417) | [1] | | | |
| Bromoform | ND | (0.545) | [1] | ND | (0.504) | [1] | ND | (0.530) | [1] | ND | (0.602) | [1] | | | |
| Bromomethane (Methylbromide) | ND | (0.347) | [1] | ND | (0.321) | [1] | ND | (0.337) | [1] | ND | (0.383) | [1] | | | |
| Carbon tetrachloride | ND | (0.439) | [1] | ND | (0.406) | [1] | ND | (0.427) | [1] | ND | (0.485) | [1] | | | |
| Chlorobenzene | ND | (0.266) | [1] | ND | (0.246) | [1] | ND | (0.259) | [1] | ND | (0.294) | [1] | | | |
| Chloroethane | ND | (0.421) | [1] | ND | (0.390) | [1] | ND | (0.410) | [1] | ND | (0.466) | [1] | | | |
| Chloroform | ND | (0.158) | [1] | ND | (0.146) | [1] | ND | (0.154) | [1] | ND | (0.175) | [1] | | | |
| Chloromethane | ND | (0.754) | [1] | ND | (0.697) | [1] | ND | (0.734) | [1] | ND | (0.833) | [1] | | | |
| Dibromochloromethane | ND | (0.342) | [1] | ND | (0.316) | [1] | ND | (0.333) | [1] | ND | (0.378) | [1] | | | |
| Dibromomethane | ND | (0.305) | [1] | ND | (0.283) | [1] | ND | (0.297) | [1] | ND | (0.338) | [1] | | | |
| Dichlorodifluoromethane | ND | (0.322) | [1] | ND | (0.298) | [1] | ND | (0.314) | [1] | ND | (0.356) | [1] | | | |
| Ethylbenzene | 45.4 | (2.24) | [1] | ND | (0.363) | [1] | ND | (0.382) | [1] | ND | (0.434) | [1] | | | |
| Hexachloro-1,3-butadiene | ND | (0.880) | [1] | ND | (0.814) | [1] | ND | (0.857) | [1] | ND | (0.973) | [1] | | | |
| Isopropylbenzene | ND | (0.425) | [1] | ND | (0.393) | [1] | ND | (0.414) | [1] | ND | (0.470) | [1] | | | |
| Methylene chloride | ND | (0.252) | [1] | ND | (0.237) | [1] | ND | (0.246) | [1] | ND | (0.279) | [1] | | | |
| Naphthalene | ND | (0.525) | [1] | ND | (0.486) | [1] | ND | (0.511) | [1] | ND | (0.580) | [1] | | | |
| Styrene | ND | (0.317) | [1] | ND | (0.293) | [1] | ND | (0.308) | [1] | ND | (0.350) | [1] | | | |
| Tetrachloroethene | ND | (0.448) | [1] | ND | (0.415) | [1] | ND | (0.437) | [1] | ND | (0.496) | [1] | | | |
| Toluene | 60.8 | (1.63) | [1] | ND | (0.264) | [1] | ND | (0.277) | [1] | ND | (0.315) | [1] | | | |
| Trichloroethene | 415 | E (0.397) | [1] | 130 | (0.367) | [1] | ND | (0.387) | [1] | ND | (0.439) | [1] | | | |

Compiled: 05/10/01

() = Detection Limit [] = Dilution Factor ND = Not Detected NA = Not Applicable

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 12

| PARAMETER | SITE ID | | | | | | | | | | | | | | | | | | | |
|---|------------------------------|---|-------|---|-----------------|----|---|-------|-----------------|-----|----|---|-----------------|---|-----|----|---|-------|---|-----|
| | LOCATION ID | | | | | | | | | | | | | | | | | | | |
| | SAMPLE ID | | | | | | | | | | | | | | | | | | | |
| | DATE SAMPLED | | | | | | | | | | | | | | | | | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | | | | | | | | | | | | | | | | | |
| | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | Bldg181 | | | | | | | |
| | TMP1 | | | | TMP1 | | | | TMP1 | | | | TMP1 | | | | | | | |
| | AFP4-SPH-S027-1 Dup of | | | | AFP4-SPH-S029-0 | | | | AFP4-SPH-S030-0 | | | | AFP4-SPH-S031-0 | | | | | | | |
| | AFP4-SPH-S027-0 | | | | | | | | | | | | | | | | | | | |
| | 20-NOV-2000 | | | | 20-NOV-2000 | | | | 20-NOV-2000 | | | | 20-NOV-2000 | | | | | | | |
| | 4-6 | | | | 6-8 | | | | 14-16 | | | | 24-26 | | | | | | | |
| ----- | ----- | | | | ----- | | | | ----- | | | | ----- | | | | | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | | | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | ND | (| 0.367 |) | [1] | ND | (| 0.340 |) | [1] | ND | (| 0.357 |) | [1] | ND | (| 0.406 |) | [1] |
| Vinyl chloride | ND | (| 0.337 |) | [1] | ND | (| 0.312 |) | [1] | ND | (| 0.328 |) | [1] | ND | (| 0.373 |) | [1] |
| cis-1,2-Dichloroethene | ND | (| 0.259 |) | [1] | ND | (| 0.239 |) | [1] | ND | (| 0.252 |) | [1] | ND | (| 0.286 |) | [1] |
| cis-1,3-Dichloropropene | ND | (| 0.301 |) | [1] | ND | (| 0.278 |) | [1] | ND | (| 0.293 |) | [1] | ND | (| 0.333 |) | [1] |
| n-Butylbenzene | 7.63 | (| 4.44 |) | [1] | ND | (| 0.719 |) | [1] | ND | (| 0.757 |) | [1] | ND | (| 0.859 |) | [1] |
| n-Propylbenzene | 7.61 | (| 3.95 |) | [1] | ND | (| 0.639 |) | [1] | ND | (| 0.672 |) | [1] | ND | (| 0.763 |) | [1] |
| o-Xylene | 7.67 | (| 2.50 |) | [1] | ND | (| 0.405 |) | [1] | ND | (| 0.427 |) | [1] | ND | (| 0.484 |) | [1] |
| p-Xylene/m-Xylene | 17.8 | (| 4.27 |) | [1] | ND | (| 0.691 |) | [1] | ND | (| 0.728 |) | [1] | ND | (| 0.826 |) | [1] |
| sec-Butylbenzene | ND | (| 0.581 |) | [1] | ND | (| 0.538 |) | [1] | ND | (| 0.566 |) | [1] | ND | (| 0.642 |) | [1] |
| tert-Butylbenzene | ND | (| 0.469 |) | [1] | ND | (| 0.434 |) | [1] | ND | (| 0.457 |) | [1] | ND | (| 0.518 |) | [1] |
| trans-1,2-Dichloroethene | ND | (| 0.305 |) | [1] | ND | (| 0.282 |) | [1] | ND | (| 0.297 |) | [1] | ND | (| 0.337 |) | [1] |
| trans-1,3-Dichloropropene | ND | (| 0.419 |) | [1] | ND | (| 0.387 |) | [1] | ND | (| 0.407 |) | [1] | ND | (| 0.463 |) | [1] |

TABLE 3

RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, AFP4 SPH3

Page: 13

| | SITE ID | | |
|--|------------------------------|---------|-------|
| | LOCATION ID | | |
| | SAMPLE ID | | |
| | DATE SAMPLED | | |
| | BEG. DEPTH - END DEPTH (FT.) | | |
| | Bldg181 | | |
| | TMP1 | | |
| | AFP4-SPH-S032-0 | | |
| | 20-NOV-2000 | | |
| PARAMETER | 30-32 | | |
| ----- | ----- | | |
| SW8260B - Volatile Organic Carbons (ug/kg) | | | |
| 1,1,1,2-Tetrachloroethane | ND | (0.364 |) [1] |
| 1,1,1-Trichloroethane | ND | (0.231 |) [1] |
| 1,1,2,2-Tetrachloroethane | ND | (0.440 |) [1] |
| 1,1,2-Trichloroethane | ND | (0.352 |) [1] |
| 1,1-Dichloroethane | ND | (0.367 |) [1] |
| 1,1-Dichloroethene | ND | (0.268 |) [1] |
| 1,1-Dichloropropene | ND | (0.413 |) [1] |
| 1,2,3-Trichlorobenzene | ND | (0.602 |) [1] |
| 1,2,3-Trichloropropane | ND | (0.584 |) [1] |
| 1,2,4-Trichlorobenzene | ND | (0.650 |) [1] |
| 1,2,4-Trimethylbenzene | ND | (0.467 |) [1] |
| 1,2-Dibromo-3-chloropropane | ND | (0.481 |) [1] |
| 1,2-Dibromoethane | ND | (0.303 |) [1] |
| 1,2-Dichlorobenzene | ND | (0.311 |) [1] |
| 1,2-Dichloroethane | ND | (0.262 |) [1] |
| 1,2-Dichloropropane | ND | (0.303 |) [1] |
| 1,3,5-Trimethylbenzene | ND | (0.466 |) [1] |
| 1,3-Dichlorobenzene | ND | (0.429 |) [1] |
| 1,3-Dichloropropane | ND | (0.136 |) [1] |
| 1,4-Dichlorobenzene | ND | (0.577 |) [1] |
| 1-Chlorohexane | ND | (0.506 |) [1] |
| 2,2-Dichloropropane | ND | (0.347 |) [1] |
| 2-Chlorotoluene | ND | (0.688 |) [1] |
| 4-Chlorotoluene | ND | (0.732 |) [1] |

| PARAMETER | CONCENTRATION (ug/kg) | UNIT | REMARKS |
|---|-----------------------|-------------|---------|
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | |
| 4-Isopropyltoluene | ND | (0.632) | [1] |
| Benzene | 16.6 | (1.87) | [1] |
| Bromobenzene | ND | (0.293) | [1] |
| Bromochloromethane | ND | (0.377) | [1] |
| Bromodichloromethane | ND | (0.364) | [1] |
| Bromoform | ND | (0.525) | [1] |
| Bromomethane (Methylbromide) | ND | (0.334) | [1] |
| Carbon tetrachloride | ND | (0.423) | [1] |
| Chlorobenzene | ND | (0.257) | [1] |
| Chloroethane | ND | (0.406) | [1] |
| Chloroform | ND | (0.152) | [1] |
| Chloromethane | ND | (0.727) | [1] |
| Dibromochloromethane | ND | (0.330) | [1] |
| Dibromomethane | ND | (0.295) | [1] |
| Dichlorodifluoromethane | ND | (0.311) | [1] |
| Ethylbenzene | 20.0 | (2.21) | [1] |
| Hexachloro-1,3-butadiene | ND | (0.849) | [1] |
| Isopropylbenzene | ND | (0.410) | [1] |
| Methylene chloride | ND | (1.42) | [1] |
| Naphthalene | ND | (0.506) | [1] |
| Styrene | ND | (0.305) | [1] |
| Tetrachloroethene | ND | (0.432) | [1] |
| Toluene | 33.1 | (1.60) | [1] |
| Trichloroethene | 262 | E (0.383) | [1] |

| | SITE ID | | | |
|---|------------------------------|---------|-------|--|
| | LOCATION ID | | | |
| | SAMPLE ID | | | |
| | DATE SAMPLED | | | |
| | BEG. DEPTH - END DEPTH (FT.) | | | |
| | Bldg181 | | | |
| | TMP1 | | | |
| | AFP4-SPH-S032-0 | | | |
| | 20-NOV-2000 | | | |
| PARAMETER | 30-32 | | | |
| ----- | ----- | | | |
| SW8260B - Volatile Organic Carbons, cont. (ug/kg) | | | | |
| Trichlorofluoromethane | ND | (0.354 |) [1] | |
| Vinyl chloride | ND | (0.325 |) [1] | |
| cis-1,2-Dichloroethene | ND | (0.250 |) [1] | |
| cis-1,3-Dichloropropene | ND | (0.290 |) [1] | |
| n-Butylbenzene | ND | (0.750 |) [1] | |
| n-Propylbenzene | ND | (0.666 |) [1] | |
| o-Xylene | ND | (0.423 |) [1] | |
| p-Xylene/m-Xylene | 10.4 | (4.21 |) [1] | |
| sec-Butylbenzene | ND | (0.560 |) [1] | |
| tert-Butylbenzene | ND | (0.452 |) [1] | |
| trans-1,2-Dichloroethene | ND | (0.294 |) [1] | |
| trans-1,3-Dichloropropene | ND | (0.404 |) [1] | |

Appendix E
Laboratory Audit Report

QUALITY ASSURANCE AUDIT REPORT

Technical Systems Audit of:

**SEVERN TRENT LABORATORIES: AUSTIN SAMPLE CONTROL AND
DOCUMENT CONTROL AREA, WATER QUALITY LABORATORY, VOLATILE
ORGANIC COMPOUNDS LABORATORY, AND VOLATILES LABORATORY**

Contract Number F41624-97-D-8020

Conducted by:

URS Radian

Austin, Texas

Conducted for:

Air Force Center for Environmental Excellence

Brooks AFB, Texas

Aeronautical Systems Center

Wright-Patterson AFB, Ohio

Conducted on:

April 13, 2000

Executive Summary

A technical systems audit of Severn Trent Laboratories (STL) Austin Sample Control and Document Control Area, Water Quality Laboratory, Volatile Organic Compounds Laboratory, and Volatiles Laboratory was conducted on April 13, 2000 by Jean Youngerman, a quality assurance specialist of URS Radian's Austin technical staff. This audit was part of the pre-award audit for the Six-Phase Heating™ (SPH) pilot-scale test being performed at Air Force Plant 4 (AFP4), Fort Worth, Texas.

This audit was performed under Contract No. F41624-97-D-8020, Statement of Work (SOW) provision 3.3, and Contract Data Requirements List (CDRL) A032.

Overall, the laboratory equipment and operations were found to be in good working order and acceptable for the scope of their operations. Although no formal recommendations for corrective action were issued as a result of this audit, recommendations intended to improve the laboratory performance were made during the audit.

Table of Contents

| | |
|---|-----------|
| Executive Summary | ii |
| 1.0 Introduction | 1 |
| 1.1 Purpose | 1 |
| 1.2 Scope | 1 |
| 2.0 Audit Results..... | 2 |
| 2.1 Overall Laboratory Area..... | 2 |
| 2.2 Sample Control and Document Control Areas | 2 |
| 2.3 Water Quality Laboratory..... | 3 |
| 2.4 Volatile Organic Compounds Laboratory | 3 |
| 2.5 Volatiles Laboratory..... | 4 |
| 3.0 Summary of Recommendations | 5 |

1.0 Introduction

A technical systems audit of the Severn Trent Laboratories (STL) Austin Sample Control and Document Control Area, the Water Quality Laboratory, the Volatile Organic Compounds Laboratory, and the Volatiles Laboratory was conducted on April 13, 2000 by Jean Youngerman. Audit findings were discussed during the wrap-up meeting, which was also held on April 13, 2000. This report documents observations made and findings identified during the audit and discusses recommendations based on these findings.

1.1 Purpose

This audit was conducted as part of the Statement of Work (SOW) requirements for the Six-Phase Heating™ (SPH) pilot-scale test being performed at Air Force Plant 4 (AFP4). Specifically, the audit was performed under Contract No. F41624-97-D-8020, SOW provision 3.3, and CDRL A032. The objectives of this audit program were to provide review and assessment of laboratory systems and practices and to determine if the procedures outlined in the *Basewide Quality Assurance Project Plan (QAPP)* (HydroGeoLogic, Inc., 1998) and the *Addendum to the Basewide QAPP* (Radian, 2000) were being followed by the laboratory staff. The AFCEE QAPP, Version 3.0, was also used as a reference guide.

1.2 Scope

Four areas of STL were reviewed during this audit. These areas will each be involved with sample processing during the SPH test, and, included the Sample Control and Document Control Area, the Water Quality Laboratory, the Volatile Organic Compound Laboratory, and the Volatiles Laboratory. During the audit, documentation was reviewed, laboratory staff were interviewed, and laboratory work areas and equipment were observed. A series of checklists were used to document audit findings and observations. These completed checklists are on file in the URS Radian (Radian) QA department in Austin, TX.

The Sample Control and Document Control Area is responsible for receiving samples from shipping companies, logging the samples into the laboratory information management system (LIMS) system, checking the chain-of-custody forms for completeness, storing the samples appropriately, storing the data associated with each analysis, and issuing both hard copy and electronic reports. The Water Quality Laboratory is responsible for the analysis of chloride. The Volatile Organic Compounds Laboratory is responsible for the analysis of volatiles in air. The Volatiles Laboratory is responsible for the analysis of volatiles in water and soil.

2.0 Audit Results

This section focuses on observations, findings, and subsequent recommendations identified during the audit. Overall, the laboratory equipment and operations were found to be in good working order and acceptable for the scope of their operations. Staff members were cooperative, demonstrated appropriate technical skills, and showed interest in making improvements to their services. Analysts were familiar with the requirements as defined by the Laboratory Protocol Specifications modified for the AFP4 SPH project.

No deficiencies were identified during the audit that would definitely prevent the laboratory from achieving the project data quality objectives. Recommendations made during the audit are intended to improve the laboratory by improving the defensibility of the records and analytical data generated during analysis of samples. No formal recommendations for corrective action were issued as a result of this audit.

2.1 Overall Laboratory Area

The laboratory was neat and well prepared to handle the air, water, and soil samples for the SPH test. However, the laboratory has recently been purchased by STL and some changes are on-going. STL is combining the former Radian – Austin and Quanterra – Austin laboratories under one roof. The laboratories intend to maintain separate but equal systems. Work for the AFP4 SPH program will be done under the former Radian laboratory specifications. Radian standard laboratory procedures are documented in Protocol Specifications. These documents list the standard quality control procedures followed for each analytical method, the acceptance criteria for those procedures, and the corrective action to be followed in the event of QC failure. Projects may request special QC tests, different acceptance criteria, or different corrective action. These deviations from the normal Protocol Specifications are documented in numbered, controlled versions of the Protocol Specifications. These numbered specifications are cited when samples are logged in to document control. A number of other changes have been made at the laboratory recently. For example, two lab managers, the document control supervisor and the volatile organic compounds supervisor have recently resigned.

2.2 Sample Control and Document Control Areas

The Sample Control and Document Control Areas were audited with respect to documentation, sample custody, sample storage, data storage and handling, and familiarity with the requirements for the AFP4 SPH program. Document control had some new software to report data. This software has only been in use since November 1999 and some of the reporting

options have changed recently. The report used to transfer data electronically had changed the week of the audit. The technician was not familiar with it yet. It was recommended that a procedure be developed and documented so that any trained document control person can transfer data electronically.

2.3 Water Quality Laboratory

The Water Quality Laboratory was audited for the appropriate facilities and equipment, chemicals and standards, calibration procedures, quality control procedures, documentation, and compliance with the Basewide QAPP and the SPH-specific addendum to the QAPP. One recommendation was made to the staff at the time of the audit. If a run is abandoned because the QC failed, and that analysis is not reported to the client, then no documentation is made regarding the failed QC, i.e., an exception report is not filed. It was recommended that failed QC be tracked even though it is not reported to the client.

No recommendations were made regarding quality control procedures, facilities and equipment, chemicals and standards, or compliance with the Basewide QAPP or the addendum to the QAPP.

2.4 Volatile Organic Compounds Laboratory

The Volatile Organic Compounds Laboratory was audited for the appropriate facilities and equipment, chemicals and standards, calibration procedures, quality control procedures, documentation, and compliance with the Basewide QAPP or the addendum to the QAPP. Three recommendations were made to the staff at the time of the audit.

One recommendation was made regarding documentation. At the time of the audit, the logbook used to document cleaning of the canisters was a stapled loose-leaf set of papers. The acting laboratory manager stated that the logbook had been full and that he had requested a new one. By the time of the wrap-up, a bound logbook was being used to record canister cleaning.

One recommendation was made regarding quality control procedures. The software used to calculate the concentrations after dilution has not been verified by hand calculations. The laboratory manager felt that this calculation had been done but could not lay his hands upon the calculations. It was recommended that the software be verified and that the calculations be kept in a secure location.

One recommendation was made regarding terminology. A date is marked on the laboratory control sample (LCS) canister to remind the analysts to prepare a new LCS before the one in house has been used up. The date is labeled as an expiration date. However, the LCS has not expired and is still usable, but there may not be much more in that canister. It was recommended that this date be named differently so that auditors are not confused.

No recommendations were made regarding facilities and equipment, chemicals and standards, or compliance with the Basewide QAPP or the addendum to the QAPP.

2.5 Volatiles Laboratory

The Volatiles Laboratory was audited for the appropriate facilities and equipment, chemicals and standards, calibration procedures, quality control procedures, documentation, and compliance with the Basewide QAPP or the addendum to the QAPP. Two recommendations, both regarding documentation, were made to the staff at the time of the audit.

First, it was STL practice that if a run is abandoned because the QC failed, and that analysis is not reported to the client, then no documentation is made regarding the failed QC, i.e., an exception report is not filed. It was recommended that failed QC be tracked even though it is not reported to the client.

Second, at the time of the audit, the diluent solvent (methanol) was not recorded by manufacturer or batch in the standards log. This was clearly an oversight, since a pre-labeled column existed for this information. It was recommended that the information be presented in the logbook.

No recommendations were made regarding facilities and equipment, chemicals and standards, quality control procedures, or compliance with the Basewide QAPP or the addendum to the QAPP.

3.0 Summary of Recommendations

Table 3-1 summarizes the Radian recommendations to STL Austin for improving laboratory performance for the AFP4 sample analysis and reporting.

Table 3-1. Summary of Audit Recommendations

| Laboratory Area | Recommendations |
|---------------------------------------|---|
| Sample Control/Document Control | Develop and document a procedure for storing and exporting data files. |
| Water Quality Laboratory | Document failed QC runs so that systematic problems may be tracked. |
| Volatile Organic Compounds Laboratory | Bind the log in the cleaning area so that pages are not lost. Verify and document that the software used to calculate dilute concentrations works appropriately. Change the terminology for noting that the LCS needs to be remade from "expired" to "almost empty" or "make more now" or something else appropriate. |
| Volatiles Laboratory | Document failed QC runs so that systematic problems may be tracked. |

Appendix F
SPH Site Log

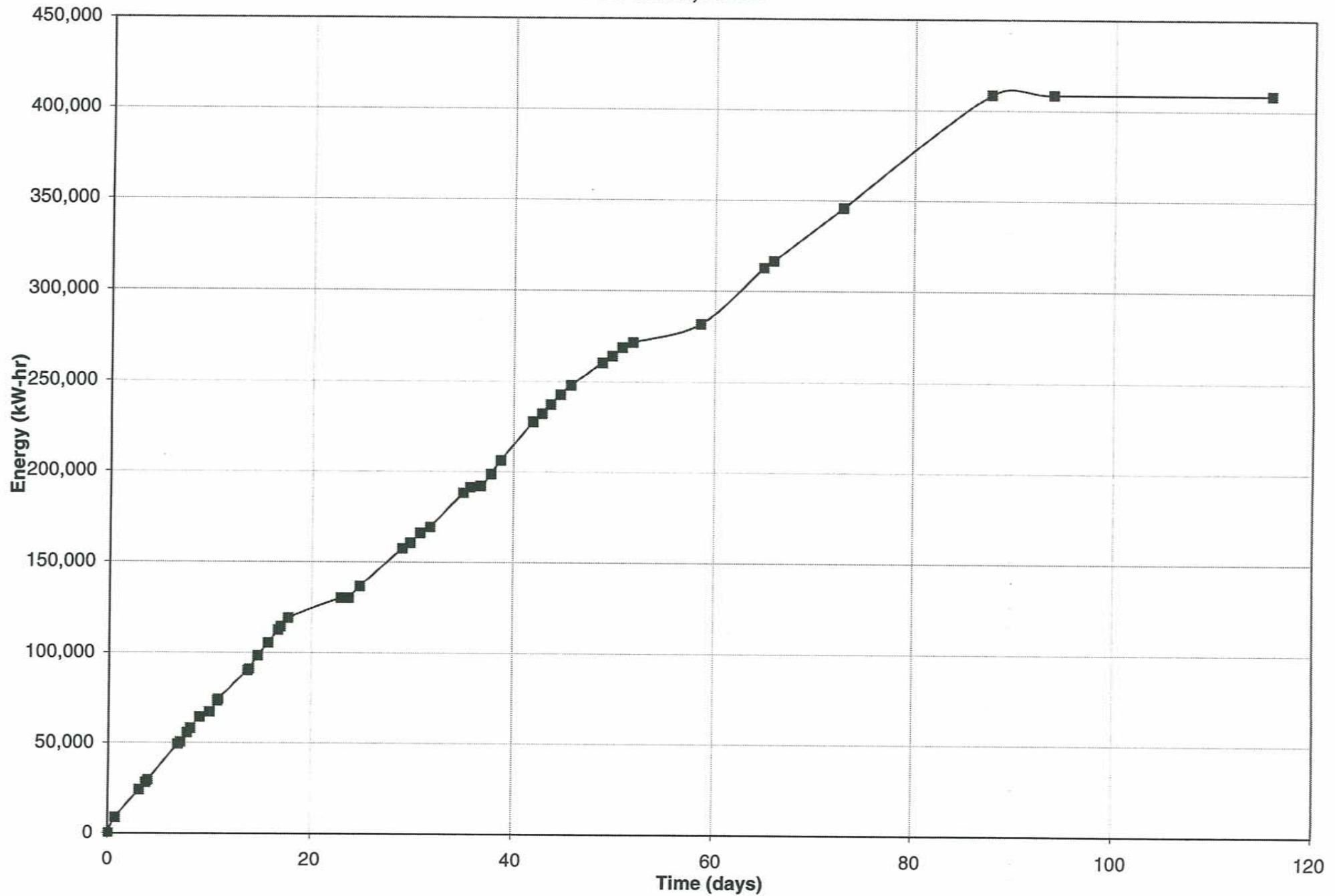
Fort Worth, Texas

| For Worth, Texas | | | | | | | | | |
|------------------|-------------|---------------|-------------------|-------------------|--------------|--------------|---------------------|------------------|-------------|
| | | Condenser | | | | | | | |
| | | | | | | | | SPH Power Supply | |
| | | HX Inlet Temp | HX Discharge Temp | Totalizer Reading | VEU Downtime | Inlet Vacuum | Pitot Tube dP | kW-hr Meter | MW-hr Meter |
| | Typ Reading | 145 | 80 | | | 6 | 0.85 | | |
| Date | Time | (° F) | (° F) | (gallons) | (hours) | ("Hg) | ("H ₂ O) | (kW-hr) | (MW-hr) |
| 07/27/00 | 15:40 | 96 | 105 | 0.0 | 0.0 | 6 | 1.36 | 1006452 | 0 |
| 08/01/00 | 12:45 | 96 | 105 | 0.0 | 0.0 | 6 | 1.36 | 1006452 | |
| 08/07/00 | 15:50 | 96 | 105 | 0.0 | 0.0 | 6 | 1.36 | 1006452 | |
| 08/08/00 | 9:30 | 96 | 105 | 0.0 | 0.0 | 6 | 1.36 | 1015185 | |
| 08/10/00 | 17:30 | 96 | 105 | 0.0 | 0.0 | 6.2 | 1.36 | 1030618 | |
| 08/11/00 | 9:20 | 95 | 88 | 0.0 | 0.0 | 6.2 | 1.36 | 1034804 | |
| 08/11/00 | 14:30 | 94 | 104 | 0.0 | 0.0 | 5.7 | 1.03 | 1036170 | 587.2 |
| 08/14/00 | 11:45 | 95 | 95 | 0.0 | 0.0 | 5.8 | 0.78 | 1055900 | 1220.2 |
| 08/14/00 | 17:30 | 100 | 106 | 0.0 | 0.0 | 5.7 | 0.95 | 1056995 | 1242.5 |
| 08/15/00 | 9:00 | 98 | 88 | 0.0 | 0.0 | 5.8 | 0.81 | 1062153 | |
| 08/15/00 | 17:00 | 102 | 106 | 0.0 | 0.0 | 5.8 | 0.85 | 1064609 | |
| 08/16/00 | 15:15 | 108 | 108 | 13.7 | 0.0 | 5.7 | 0.83 | 1070733 | |
| 08/17/00 | 14:45 | 106 | 110 | 33.5 | 18.8 | 5.8 | 0.9 | 1073503 | |
| 08/18/00 | 8:45 | 110 | 91 | 49.7 | 0.0 | 5.9 | 0.8 | 1079858 | |
| 08/18/00 | 11:15 | 111 | 96 | 57.5 | 0.0 | 5.9 | 0.81 | 1080765 | |
| 08/21/00 | 8:15 | 120 | 88 | 276.3 | 0.0 | 7 | 0.84 | 1096613 | |
| 08/21/00 | 11:15 | 121 | 94 | 304.7 | 0.0 | 6.9 | 0.88 | 1097290 | |
| 08/22/00 | 8:00 | 129 | 88 | 385.9 | 0.0 | 7.15 | 0.81 | 1104618 | |
| 08/23/00 | 8:30 | 138 | 84 | 564.9 | 0.0 | 6.4 | 0.64 | 1111729 | |
| 08/24/00 | 8:20 | 142 | 84 | 756.9 | 0.0 | 6.4 | 0.62 | 1119043 | |
| 08/24/00 | 14:45 | 146 | 108 | 828.5 | 0.0 | 6.2 | 0.7 | 1120961 | |
| 08/25/00 | 7:35 | 146 | 86 | 1023.7 | 3.0 | 6.4 | 0.64 | 1125513 | |
| 08/30/00 | 13:15 | 142 | 110 | 1648.0 | 65.5 | 6.1 | 0.8 | 1136813 | |
| 08/31/00 | 7:45 | 142 | 89 | 1821.3 | 0.0 | 6.2 | 0.75 | 1136813 | |
| 09/01/00 | 11:10 | 147 | 105 | 2130.7 | 1.0 | 7.2 | 0.82 | 1143130 | |
| 09/05/00 | 16:00 | 156 | 110 | 3725.0 | 0.0 | 6.2 | 0.68 | 1163705 | |
| 09/06/00 | 10:00 | 157 | 87 | 4035.0 | 0.0 | 6 | 0.6 | 1166889 | |
| 09/07/00 | 10:00 | 158 | 90 | 4520.0 | 0.0 | 6.1 | 0.58 | 1172248 | |
| 09/08/00 | 10:00 | 157 | 85 | 4969.0 | 0.0 | 7.2 | 0.6 | 1175622 | |
| 09/11/00 | 16:00 | 165 | 113 | 6836.0 | 0.0 | 7.4 | 0.54 | 1194581 | |
| 09/12/00 | 9:00 | 164 | 93 | 7232.0 | 0.0 | 7.4 | 0.49 | 1197842 | |
| 09/13/00 | 9:00 | 158 | 81 | 7731.0 | 0.0 | 7.4 | 0.57 | 1198491 | |
| 09/14/00 | 10:00 | 163 | 87 | 8321.0 | 0.0 | 7.6 | 0.51 | 1205220 | |
| 09/15/00 | 9:30 | 168 | 88 | 8948.0 | 0.0 | 7.7 | 0.41 | 1212800 | |
| 09/18/00 | 14:30 | 170 | 104 | 11268.4 | 0.0 | 7.5 | 0.38 | 1234077 | |
| 09/19/00 | 11:30 | 168 | 93 | 11922.2 | 0.0 | 8.2 | 0.33 | 1238503 | |
| 09/20/00 | 8:15 | 170 | 84 | 12565.0 | 0.0 | 8.3 | 0.36 | 1243540 | |
| 09/21/00 | 8:00 | 170 | 82 | 13325.0 | 0.0 | 8.2 | 0.42 | 1249000 | |
| 09/22/00 | 8:30 | 170 | 88 | 14136.9 | 0.0 | 8.2 | 0.47 | 1254190 | |
| 09/25/00 | 11:15 | 167 | 62 | 16433.8 | 0.0 | 8.3 | 0.51 | 1266667 | |
| 09/26/00 | 11:00 | 164 | 70 | 17165.3 | 0.0 | 8.2 | 0.7 | 1270428 | |
| 09/27/00 | 10:00 | 165 | 73 | 17938.5 | 0.0 | 8.1 | 0.75 | 1275221 | |
| 09/28/00 | 11:50 | 164 | 84 | 18767.5 | 0.0 | 7.8 | 0.75 | 1277958 | |
| 10/05/00 | 7:03 | 148 | 82 | 22159.0 | | 7.4 | 1.28 | 1288178 | |
| 10/11/00 | 14:15 | 157 | 79 | 25431.0 | 20.0 | 7.4 | 1.28 | 1319243 | |
| 10/12/00 | 14:07 | 156 | 82 | 26065.0 | | 7.2 | 1.22 | 1323051 | |
| 10/19/00 | 13:00 | 155 | 82 | 30864.0 | | 7.2 | 1.23 | 1352368 | |
| 11/03/00 | 6:45 | 154 | 72 | 40125.0 | | 7.2 | 1.25 | 1414857 | |
| 11/09/00 | 10:00 | 140 | 72 | 43217.0 | | 7.2 | 1.23 | 1414857 | |
| 12/01/00 | 8:40 | 112 | 59 | 47434.0 | | 7.2 | 1.25 | 1414857 | |

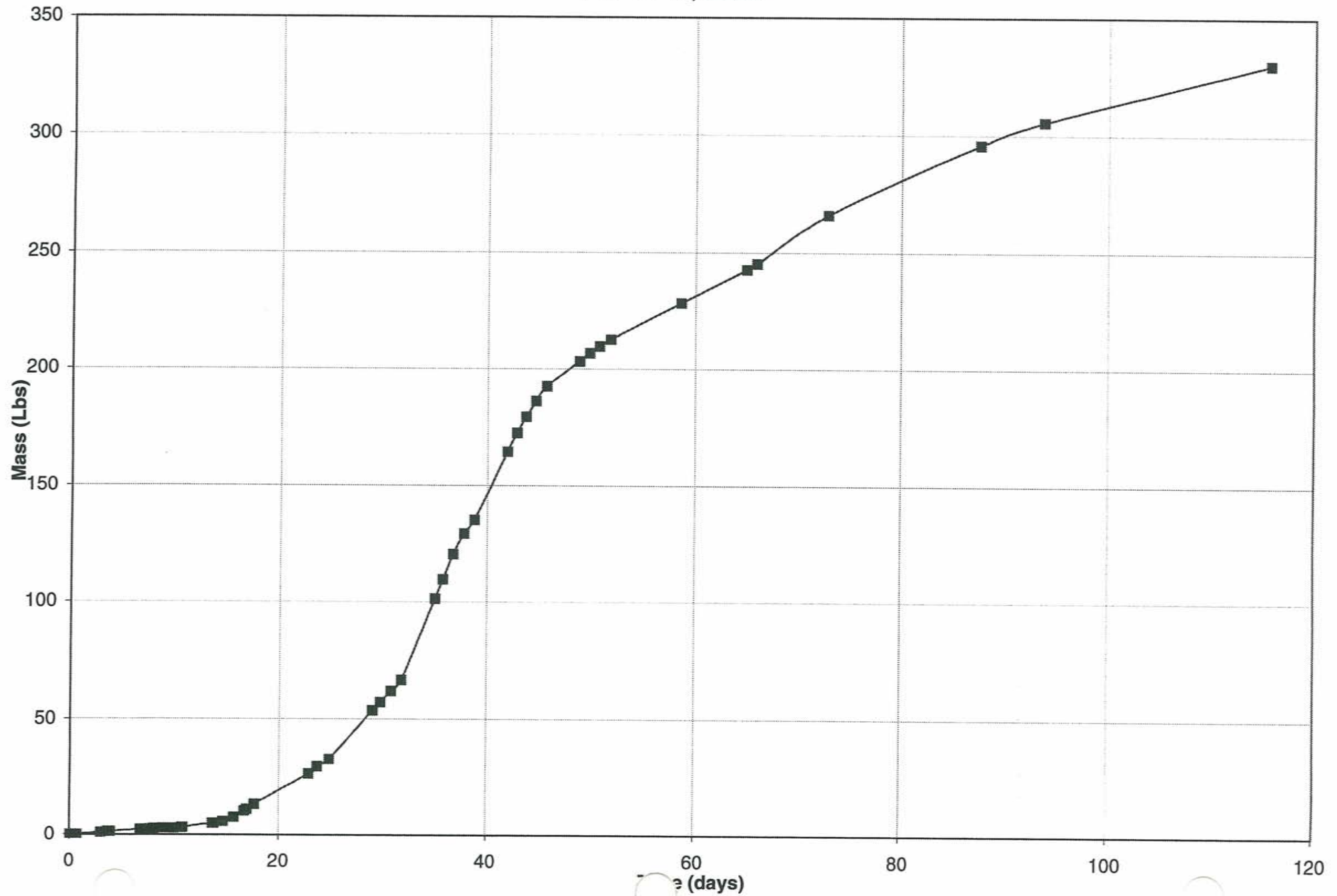
Table 1
Six Phase Heating Calculation Spreadsheet
Air Force Plant 4
Fort Worth, Texas

| Date | Time | Elapsed Time (days) | SPH Data | | | Vapor Recovery Data | | | | | | | Steam Recovery | |
|----------|-------|---------------------|------------------------------------|-------------------------|---------------------|------------------------|------------------------------------|--------------------------------|-------------------|----------------------------------|-------------------------|-------------------------------|---------------------------|-------------------------------|
| | | | Energy Input to Subsurface (kW-hr) | Recent Power Input (kW) | Average Power Input | Blower Runtime (hours) | Incremental Runtime Efficiency (%) | Average Runtime Efficiency (%) | Vapor Flow (SCFM) | Vapor Conc. (mg/m ³) | Recovery Rate (lbs/day) | Cumulative VOC Recovery (lbs) | Water Totalizer (gallons) | Steam Recovery Rate (gal/day) |
| 07/27/00 | 15:40 | 0 | 0 | 0 | 0 | 0 | 0 | na | na | na | na | 0 | 0 | 0 |
| 08/01/00 | 12:45 | 0 | 0 | 0 | 0 | 0 | 0 | na | na | na | na | 0 | 0 | 0 |
| 08/07/00 | 15:50 | 0 | 0 | 0 | 0 | 0 | 0 | na | 119 | na | na | 0 | 0 | 0 |
| 08/08/00 | 9:30 | 1 | 8,733 | 494 | 494 | 18 | 100 | 100 | 119 | 40 | 0.4 | 0 | 0 | 0 |
| 08/10/00 | 17:30 | 3 | 24,166 | 276 | 276 | 74 | 100 | 100 | 119 | 40 | 0.4 | 1 | 0 | 0 |
| 08/11/00 | 9:20 | 4 | 28,352 | 264 | 273 | 90 | 100 | 100 | 120 | 34 | 0.4 | 1 | 0 | 0 |
| 08/11/00 | 14:30 | 4 | 29,718 | 264 | 273 | 95 | 100 | 100 | 104 | 34 | 0.3 | 1 | 0 | 0 |
| 08/14/00 | 11:45 | 7 | 49,448 | 285 | 278 | 164 | 100 | 100 | 91 | 35 | 0.3 | 2 | 0 | 0 |
| 08/14/00 | 17:30 | 7 | 50,543 | 190 | 275 | 170 | 100 | 100 | 100 | 35 | 0.3 | 2 | 0 | 0 |
| 08/15/00 | 9:00 | 8 | 55,701 | 333 | 280 | 185 | 100 | 100 | 94 | 35 | 0.3 | 2 | 0 | 0 |
| 08/15/00 | 17:00 | 8 | 58,157 | 307 | 282 | 193 | 100 | 100 | 94 | 35 | 0.3 | 2 | 0 | 0 |
| 08/16/00 | 15:15 | 9 | 64,281 | 275 | 281 | 215 | 100 | 100 | 93 | 34 | 0.3 | 3 | 14 | 15 |
| 08/17/00 | 14:45 | 10 | 67,051 | 118 | 264 | 220 | 20 | 92 | 97 | 33 | 0.3 | 3 | 34 | 20 |
| 08/18/00 | 8:45 | 11 | 73,406 | 353 | 270 | 238 | 100 | 93 | 93 | 32 | 0.3 | 3 | 50 | 22 |
| 08/18/00 | 11:15 | 11 | 74,313 | 363 | 271 | 241 | 100 | 93 | 93 | 34 | 0.3 | 3 | 58 | 75 |
| 08/21/00 | 8:15 | 14 | 90,161 | 230 | 262 | 310 | 100 | 94 | 93 | 80 | 0.7 | 5 | 276 | 76 |
| 08/21/00 | 11:15 | 14 | 90,838 | 226 | 262 | 313 | 100 | 94 | 95 | 82 | 0.7 | 5 | 305 | 227 |
| 08/22/00 | 8:00 | 15 | 98,166 | 353 | 267 | 333 | 100 | 95 | 91 | 96 | 0.8 | 6 | 386 | 94 |
| 08/23/00 | 8:30 | 16 | 105,277 | 290 | 269 | 358 | 100 | 95 | 83 | 239 | 1.8 | 8 | 565 | 175 |
| 08/24/00 | 8:20 | 17 | 112,591 | 307 | 271 | 382 | 100 | 95 | 81 | 378 | 2.8 | 10 | 757 | 193 |
| 08/24/00 | 14:45 | 17 | 114,509 | 299 | 272 | 388 | 100 | 95 | 85 | 415 | 3.2 | 11 | 829 | 268 |
| 08/25/00 | 7:35 | 18 | 119,061 | 270 | 272 | 402 | 82 | 95 | 82 | 496 | 3.7 | 13 | 1,024 | 278 |
| 08/30/00 | 13:15 | 23 | 130,361 | 90 | 229 | 462 | 48 | 84 | 91 | 651 | 5.3 | 27 | 1,648 | 119 |
| 08/31/00 | 7:45 | 24 | 130,361 | 0 | 221 | 481 | 100 | 85 | 89 | 523 | 4.2 | 30 | 1,821 | 225 |
| 09/01/00 | 11:10 | 25 | 136,678 | 230 | 221 | 507 | 96 | 85 | 90 | 342 | 2.8 | 33 | 2,131 | 271 |
| 09/05/00 | 16:00 | 29 | 157,253 | 204 | 219 | 608 | 100 | 87 | 83 | 661 | 5.0 | 54 | 3,725 | 379 |
| 09/06/00 | 10:00 | 30 | 160,437 | 177 | 218 | 626 | 100 | 88 | 80 | 666 | 4.8 | 57 | 4,035 | 413 |
| 09/07/00 | 10:00 | 31 | 165,796 | 223 | 218 | 650 | 100 | 88 | 79 | 672 | 4.7 | 62 | 4,520 | 485 |
| 09/08/00 | 10:00 | 32 | 169,170 | 141 | 215 | 674 | 100 | 88 | 78 | 677 | 4.8 | 67 | 4,969 | 449 |
| 09/11/00 | 16:00 | 35 | 188,129 | 243 | 218 | 752 | 100 | 89 | 72 | 1644 | 10.7 | 101 | 6,836 | 574 |
| 09/12/00 | 9:00 | 36 | 191,390 | 192 | 218 | 769 | 100 | 90 | 70 | 1855 | 11.7 | 110 | 7,232 | 559 |
| 09/13/00 | 9:00 | 37 | 192,039 | 27 | 212 | 793 | 100 | 90 | 76 | 1588 | 10.9 | 121 | 7,731 | 499 |
| 09/14/00 | 10:00 | 38 | 198,768 | 269 | 214 | 818 | 100 | 90 | 72 | 1310 | 8.4 | 129 | 8,321 | 566 |
| 09/15/00 | 9:30 | 39 | 206,348 | 323 | 217 | 841 | 100 | 91 | 64 | 1048 | 6.0 | 135 | 8,948 | 640 |
| 09/18/00 | 14:30 | 42 | 227,625 | 276 | 221 | 918 | 100 | 91 | 61 | 1665 | 9.1 | 165 | 11,288 | 723 |
| 09/19/00 | 11:30 | 43 | 232,051 | 211 | 221 | 939 | 100 | 91 | 56 | 1833 | 9.3 | 173 | 11,922 | 747 |
| 09/20/00 | 8:15 | 44 | 237,088 | 243 | 222 | 960 | 100 | 92 | 59 | 1520 | 8.1 | 180 | 12,565 | 743 |
| 09/21/00 | 8:00 | 45 | 242,548 | 230 | 222 | 984 | 100 | 92 | 64 | 1161 | 6.7 | 186 | 13,325 | 768 |
| 09/22/00 | 8:30 | 46 | 247,738 | 212 | 222 | 1008 | 100 | 92 | 68 | 1004 | 6.1 | 193 | 14,137 | 795 |
| 09/25/00 | 11:15 | 49 | 260,215 | 167 | 218 | 1083 | 100 | 92 | 72 | 523 | 3.4 | 203 | 16,434 | 737 |
| 09/26/00 | 11:00 | 50 | 263,976 | 158 | 217 | 1107 | 100 | 93 | 84 | 466 | 3.5 | 207 | 17,165 | 739 |
| 09/27/00 | 10:00 | 51 | 268,769 | 208 | 217 | 1130 | 100 | 93 | 87 | 411 | 3.2 | 210 | 17,939 | 807 |
| 09/28/00 | 11:50 | 52 | 271,506 | 106 | 214 | 1156 | 100 | 93 | 87 | 350 | 2.7 | 213 | 18,768 | 770 |
| 10/05/00 | 7:03 | 59 | 281,726 | 63 | 196 | 1319 | 100 | 94 | 114 | 224 | 2.3 | 228 | 22,159 | 499 |
| 10/11/00 | 14:15 | 65 | 312,791 | 205 | 197 | 1450 | 87 | 93 | 115 | 254 | 2.6 | 243 | 25,431 | 519 |
| 10/12/00 | 14:07 | 66 | 316,599 | 160 | 197 | 1474 | 100 | 93 | 112 | 259 | 2.6 | 245 | 26,065 | 638 |
| 10/19/00 | 13:00 | 73 | 345,916 | 176 | 195 | 1641 | 100 | 94 | 113 | 297 | 3.0 | 266 | 30,864 | 690 |
| 11/03/00 | 6:45 | 88 | 408,405 | 177 | 192 | 1995 | 100 | 95 | 115 | 197 | 2.0 | 296 | 40,125 | 628 |
| 11/09/00 | 10:00 | 94 | 408,405 | 0 | 179 | 2142 | 100 | 95 | 114 | 155 | 1.6 | 306 | 42,860 | 446 |
| 12/01/00 | 8:40 | 116 | 408,405 | 0 | 145 | 2669 | 100 | 96 | 116 | 108 | 1.1 | 330 | 47,434 | 208 |

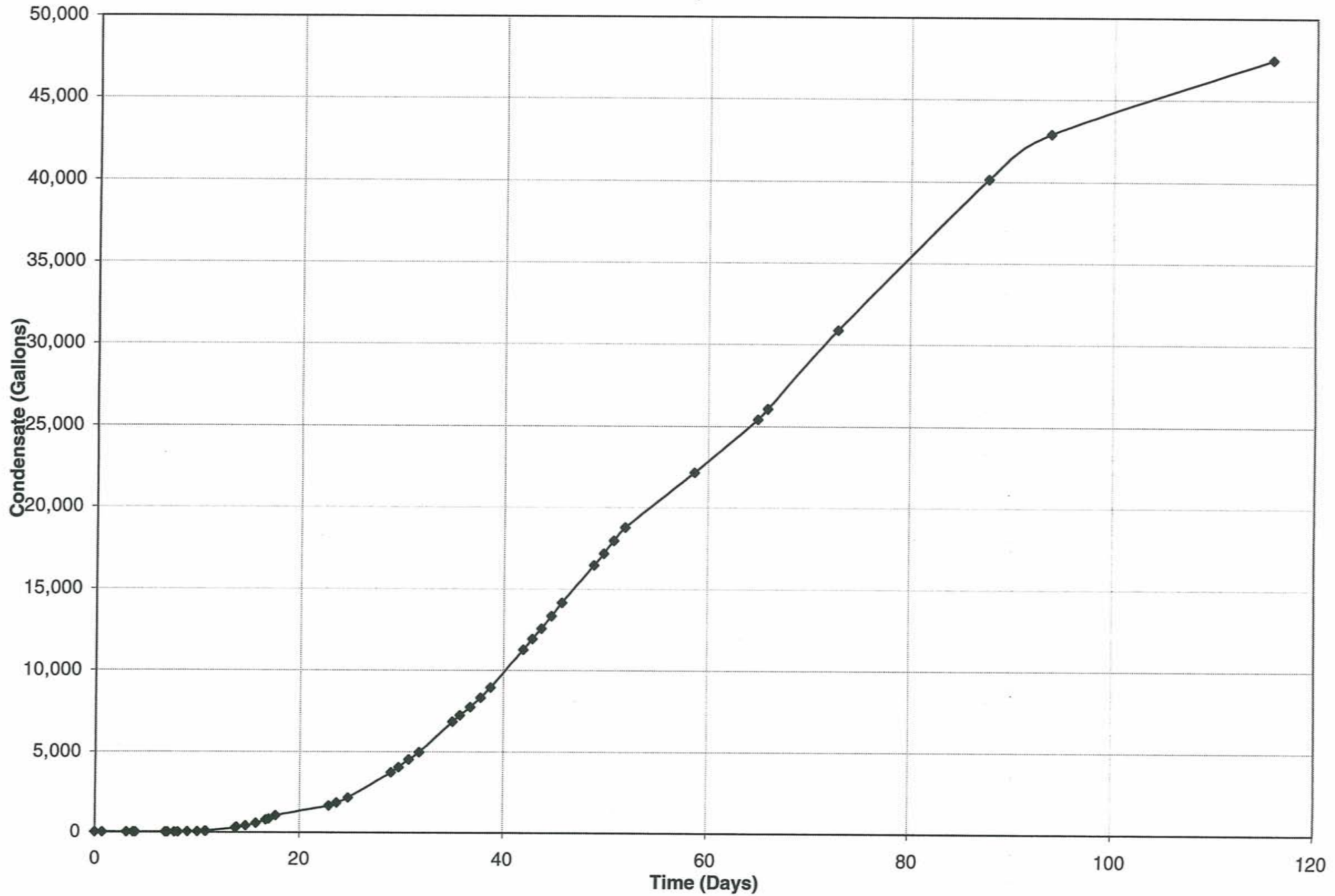
Energy Output Chart
SPH Pilot Study
Air Force Plant 4
Fort Worth, Texas



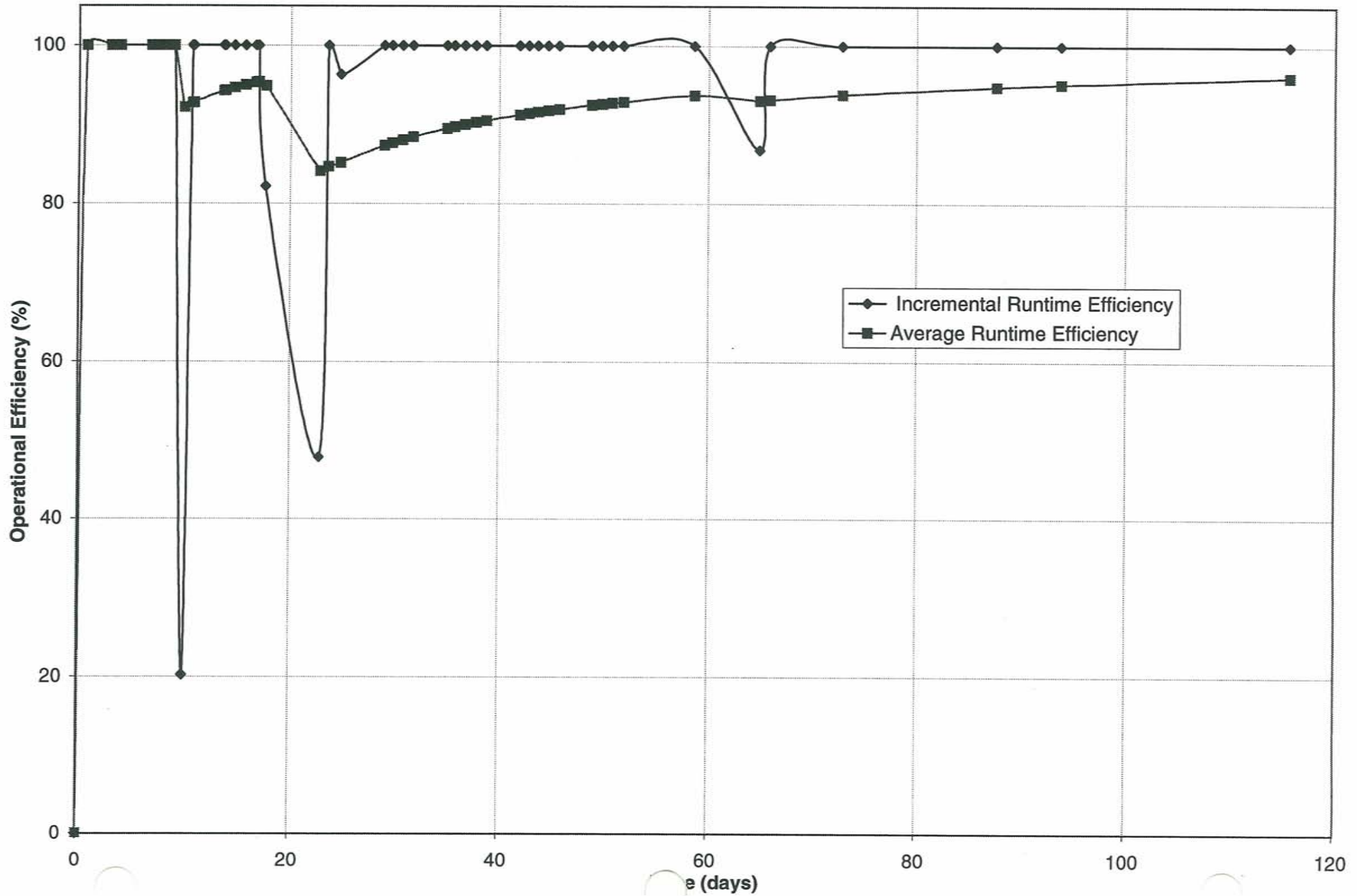
Total TCE Mass Recovery
SPH Pilot Study
Air Force Plant 4
Fort Worth, Texas



Condensate Production
SPH Pilot Study
Air Force Plant 4
Fort Worth, Texas



Vapor Treatment System Operational Efficiency
SPH Pilot Study
Air Force Plant 4
Fort Worth, Texas



Appendix G

Helium Tracer Test Memorandum

Helium Tracer Recovery Test

In response to comments provided by Patrick Haas (AFCEE) to the pilot study work plan, URS conducted helium tracer recovery tests in an attempt to quantify the effectiveness of the vapor recovery system. This memorandum describes the procedures and equipment used for the test, presents the data and results, draws conclusions, and makes recommendations for further action.

Background

In order to quantify the ability of the soil vapor recovery wells to capture mobilized contaminants from the SPSH array, URS Radian proposed conducting helium tracer recovery tests in *Six-Phase Heating Pilot-Scale Test Work Plan* (Radian, March 2000). The tests were conducted before heating (baseline), during Week 4, and during Week 9, at three depths (shallow, medium, and deep), and from three locations (two inside the array and one outside the array). The helium tracer recoveries were quantified at three pairs of locations:

1. The well closest to, and screened in the same interval as, the injection point, and
2. The combined main header to the existing SVE system.

After the baseline test was conducted, Patrick Haas recommended, and URS implemented, the following test plan modifications:

- Inject helium only at the deep locations (25 feet below grade); and
- Inject helium at TMP 3 instead of TMP 1.

In late April and early May, 2000, URS Radian supervised the installation of the electrodes, vapor recovery wells, and temperature monitoring points (TMP's) at the locations shown in Figure 1. Table 1 provides the screened intervals for the new and existing vapor recovery wells used for the pilot study array. During the week of May 22, 2000, URS Radian and Current Environmental Solutions (CES) installed the above-ground piping to connect the vapor recovery wells to the existing SVE system as shown in Figure 2.

Table 1. Screened Intervals for Vapor Recovery Wells.

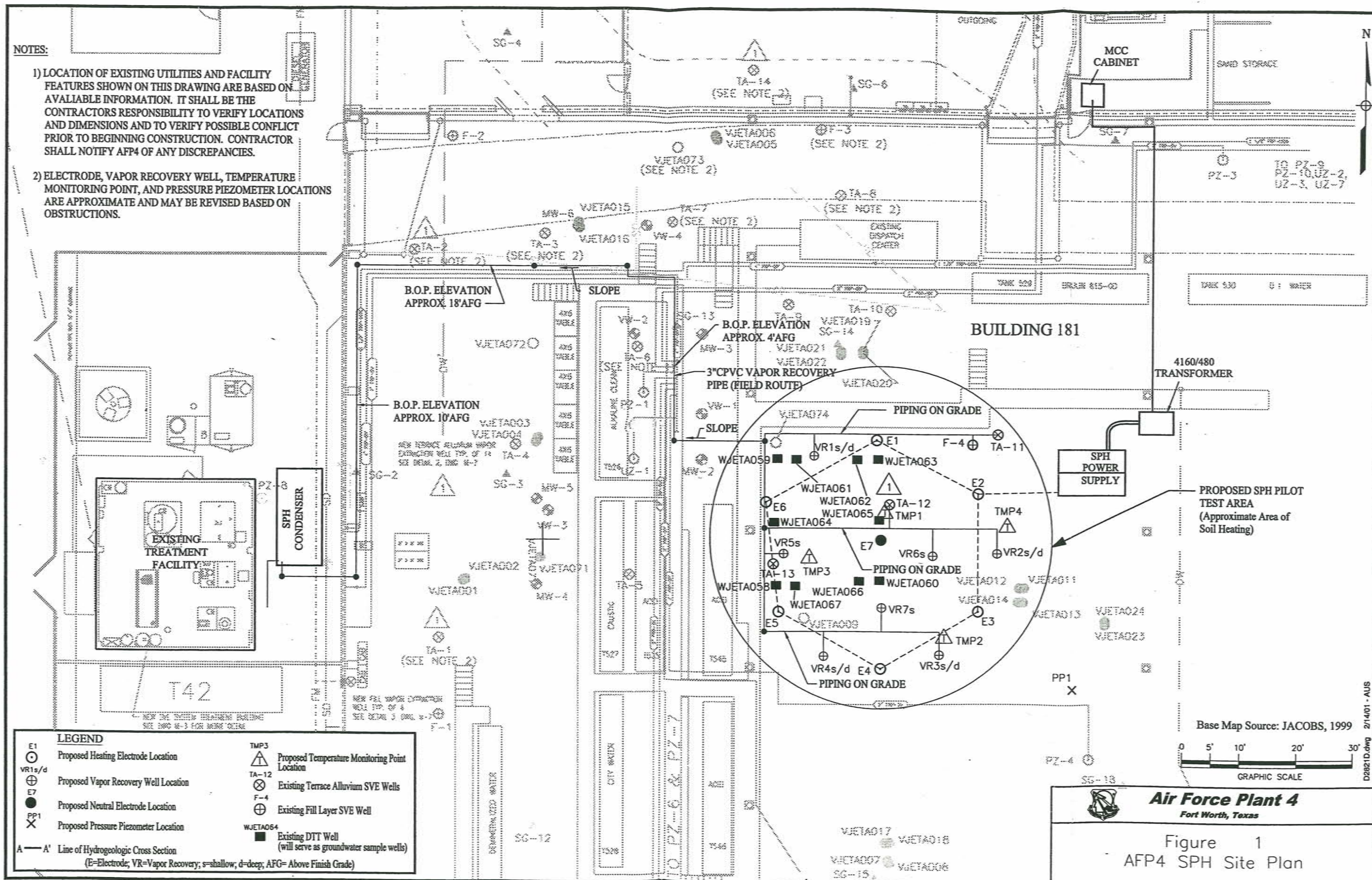
| Location | Well Type | Screened Interval (ft bgl) | Comments |
|----------|---------------------------|----------------------------|------------------------------|
| VR-1 | Vapor Recovery | 4 to 9 & 12 to 17 | 2 screened intervals (s & d) |
| VR-2 | Vapor Recovery | 4 to 9 & 12 to 17 | 2 screened intervals (s & d) |
| VR-3 | Vapor Recovery | 4 to 9 & 12 to 17 | 2 screened intervals (s & d) |
| VR-4 | Vapor Recovery | 4 to 9 & 12 to 17 | 2 screened intervals (s & d) |
| VR-5 | Vapor Recovery | 4 to 9 | shallow only |
| VR-6 | Vapor Recovery | 4 to 9 | shallow only |
| VR-7 | Vapor Recovery | 4 to 9 | shallow only |
| TA-11 | Terrace Alluvium SVE Well | 8 to 32 | based on design |
| TA-12 | Terrace Alluvium SVE Well | 8 to 32 | based on design |
| TA-13 | Terrace Alluvium SVE Well | 8 to 32 | based on design |
| F-4 | Fill Layer SVE Well | 1.5 to 4.75 | based on design |

Helium Tracer Recovery Test

Using equipment shown in Figure 3, a constant rate of 1.35 ft³/min of industrial grade helium was injected through a teflon tube at a temperature monitoring location below grade. As shown in Figure 4, soil gas from the nearest well was sampled at the well head, pulled through a series of impingers to remove soil moisture, through the vacuum pump, and through a meter to measure the dry gas volume. The exhaust of the dry gas meter was monitored with a Mark Model 9822 Helium Detector to measure the helium

NOTES:

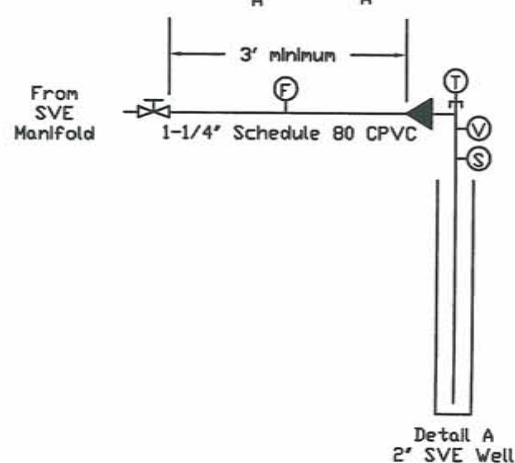
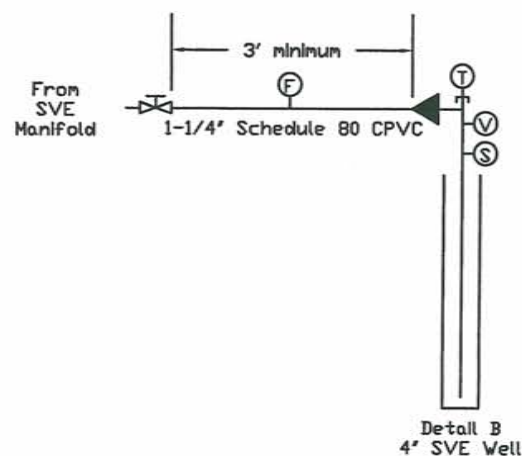
- 1) LOCATION OF EXISTING UTILITIES AND FACILITY FEATURES SHOWN ON THIS DRAWING ARE BASED ON AVAILABLE INFORMATION. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO VERIFY LOCATIONS AND DIMENSIONS AND TO VERIFY POSSIBLE CONFLICT PRIOR TO BEGINNING CONSTRUCTION. CONTRACTOR SHALL NOTIFY AFP4 OF ANY DISCREPANCIES.
- 2) ELECTRODE, VAPOR RECOVERY WELL, TEMPERATURE MONITORING POINT, AND PRESSURE PIEZOMETER LOCATIONS ARE APPROXIMATE AND MAY BE REVISED BASED ON OBSTRUCTIONS.



LEGEND:

- ⓪ VACUUM INDICATOR
- Ⓢ SAMPLE PORT
- Ⓣ FLOW INDICATOR
- Ⓣ TEMPERATURE INDICATOR
- Ⓢ BALL VALVE
- ▶ REDUCER
- THREADED CAP

Note: Pipe supports for elevated piping will be installed at 8-foot intervals



©Current Environmental Solutions LLC, 2000

SVE Piping Schematic Air Force Plant 4 Fort Worth, Texas

| | | | |
|---------|--------|----------|----------|
| Project | AFP400 | Drawn by | E. Maki |
| Date | 5/4/00 | Revision | 0 |
| Scale | NTS | Checked | G. Beyke |

Current Environmental Solutions, LLC
25108-B Marguerite Pkwy, Suite 400
Mission Viejo, CA 92692

Figure
2

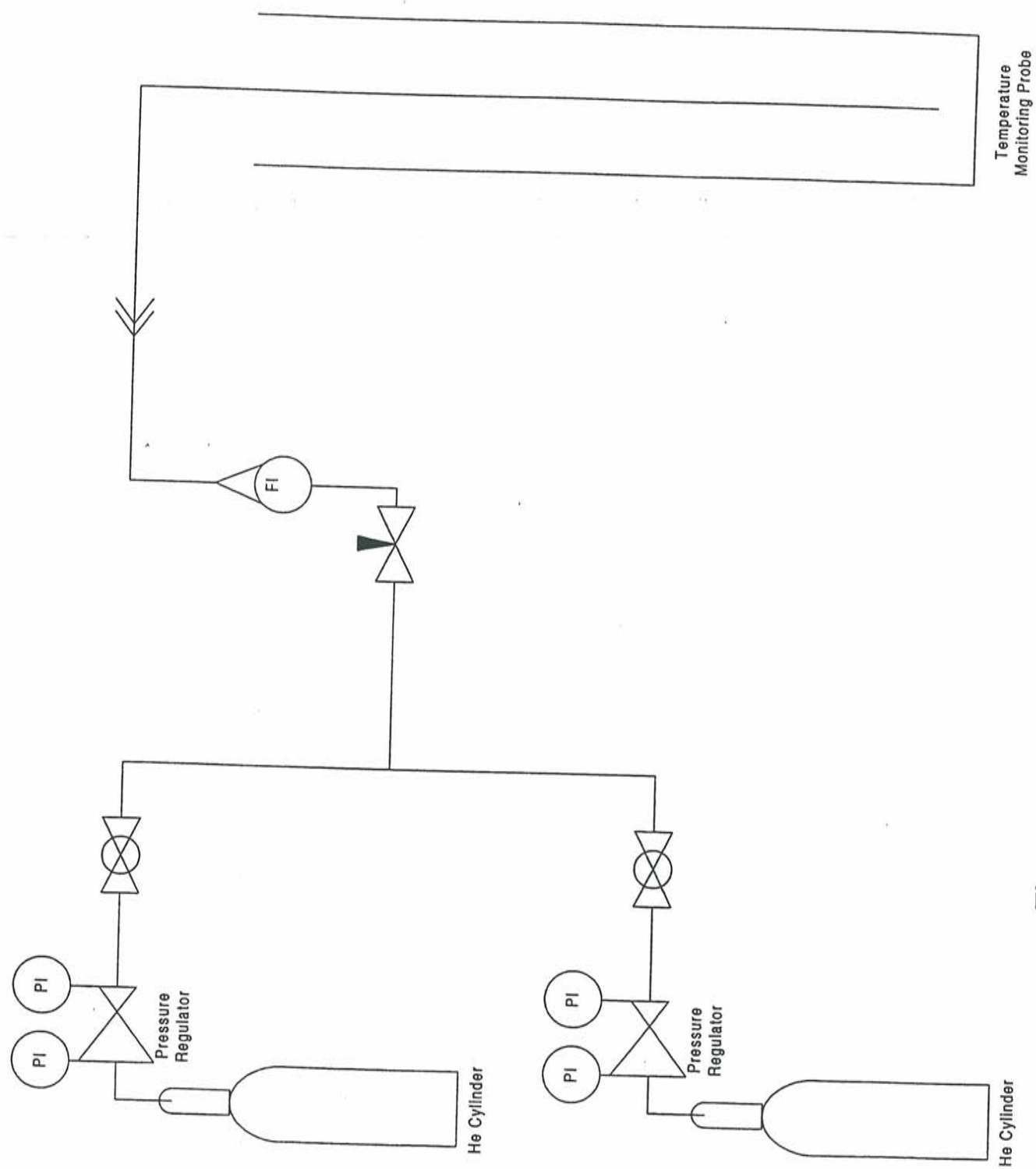


Figure 3. Helium Injection Apparatus

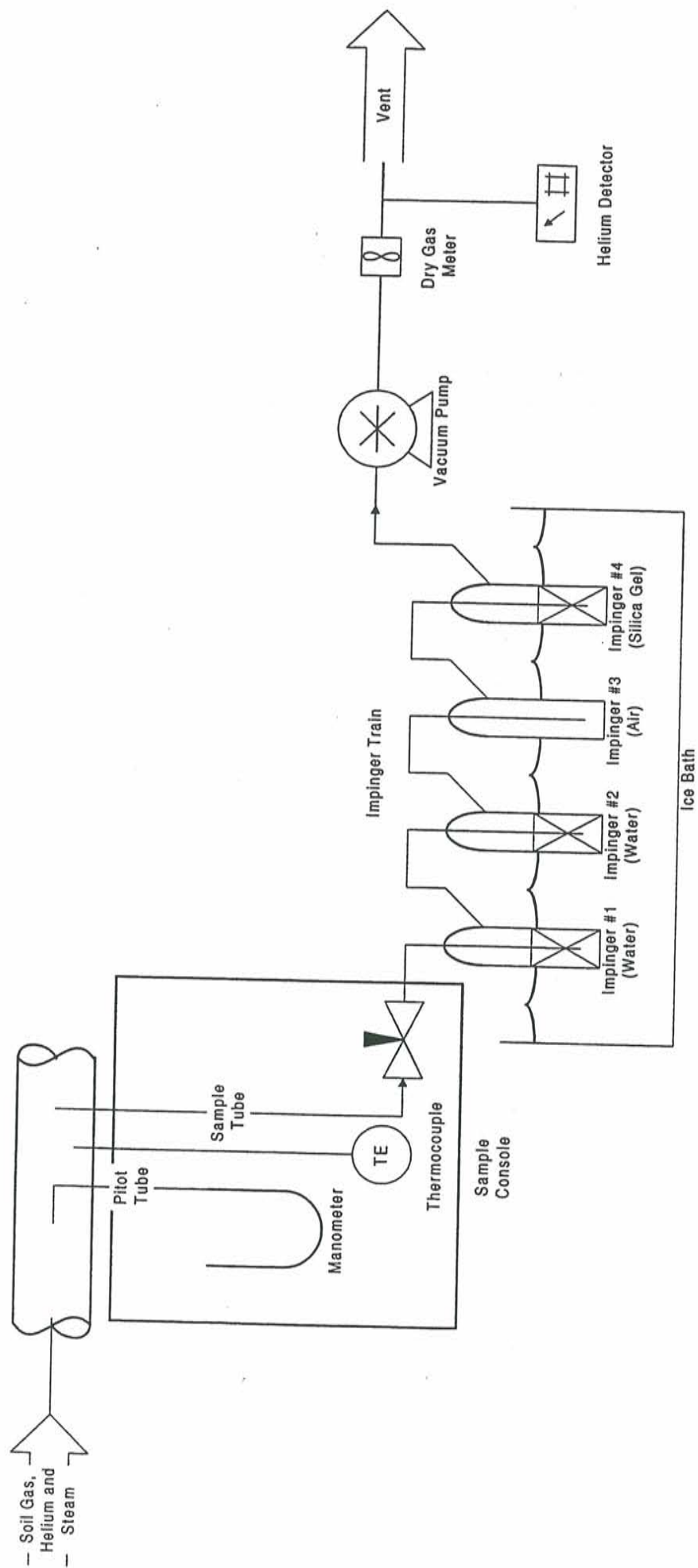


Figure 4. Helium Analyzer Apparatus

concentration, and thermocouples were used to measure the temperature of the soil gas, impinger exhaust, dry gas meter inlet, and dry gas meter outlet. A Fyrite™ kit was used to measure the oxygen and carbon dioxide concentration in the exhaust of the dry gas meter.

Helium concentrations were recorded at 2-minute intervals until the readings appeared to stabilize (two identical readings) or 1 hour elapsed. Temperature, dry gas volumes, and differential pressure readings were recorded at 5-minute intervals. Once the first test was complete, helium injection continued while the sampling was stopped, the impingers were weighed, and the sampling tube was connected to a port in the combined header. The process was repeated for samples from the combined header until the helium concentrations appeared to stabilize. The raw data sheets for the helium tracer recovery tests are attached at the end of the memorandum.

Tracer Recovery Calculation Procedures

To determine the helium tracer recovery, the following intermediate results were calculated:

1. Using the dry gas meter volume and temperature and the mass increase from the impinger train, calculate the moisture content of the sampled stream (see EPA Method 4 in Appendix A of 40 CFR Part 60);
2. Using the moisture content, correct the measured helium and oxygen concentrations for wet gas conditions. No carbon dioxide was detected;
3. Using the corrected helium and oxygen concentrations and moisture content, calculate the nitrogen concentration as the balance;
4. Given the gas composition, calculate the specific gravity with respect to air;
5. Using the pitot tube differential pressure, the soil gas static pressure and temperature, and the calculated specific gravity, calculate the soil gas flow in standard cubic feet per minute; and
6. Using the measured helium injection rate, the corrected helium concentration, and the soil gas flow rate, calculate the helium tracer recovery.

An example calculation is provided as an appendix to this memorandum, and the results of the helium tracer recovery tests are shown in Table 2.

Discussion of Results

The calculated moisture content of the soil gas measured from individual wells and the combined main header was uniformly low during baseline testing. As the heating progressed, the moisture content measured in individual wells increased with time. For example, at VR-3d, the moisture content was calculated as 2.7%, 22.6%, and 38.1% during baseline, Week 4, and Week 9, respectively. Similarly, the calculated moisture content in the combined main header also increased with time, with average values of 3%, 28.4%, and 32.0% during baseline, Week 4, and Week 9, respectively. Theoretically, the moisture content in the combined main header should not vary much between measurements taken during the same testing event. As shown in Table 2, the calculated moisture contents of the combined main header do not vary by more than 1% between the three measurements.

As an independent check of the calculated moisture content, the volume of condensate collected the day after the last helium tracer recovery test was run was 499 gallons/day. A moisture content of 32% and a flowrate of 164 scfm is equivalent to approximately 560 gallons/day, which is relatively close given the inaccuracies involved with calculating both of these numbers.

The corrected helium concentrations were in the range of 0.5% to 6.2%, except for the readings from VR-2d. The measured (uncorrected) helium concentrations at VR-2d (32% and 54%) were quite a bit higher than any other measured concentrations. Given the helium concentrations measured prior to the final readings, there is no reason to believe the recorded helium concentrations are incorrect. The high concentrations measured at VR-2d may have been the result of accumulated helium from previous tests that had not yet been extracted by the recovery network. The high measured helium concentrations along with high moisture content at VR-2d also resulted in low calculated specific gravity.

Table 2. Helium Tracer Recovery Calculations Summary

| Monitoring Point | Moisture Content (%) | | | Corrected Helium Concentration (%) | | | Extracted Gas Specific Gravity | | | Extracted Gas Flowrate (SCFM) | | | Helium Recovery (%) | | |
|------------------|----------------------|--------|--------|------------------------------------|--------|--------|--------------------------------|--------|--------|-------------------------------|--------|--------|---------------------|--------|--------|
| | Baseline | Week 4 | Week 9 | Baseline | Week 4 | Week 9 | Baseline | Week 4 | Week 9 | Baseline | Week 4 | Week 9 | Baseline | Week 4 | Week 9 |
| TA-12 | 2.0 | | | 2.4 | | | 0.97 | | | 13.8 | | | 25 | | |
| Main Header | 2.6 | | | 1.1 | | | 0.98 | | | 111.9 | | | 92 | | |
| VR-3d | 2.7 | 22.6 | 38.1 | 3.1 | 5.9 | 5.5 | 0.96 | 0.87 | 0.81 | 15.3 | 12.1 | 13.7 | 37 | 55 | 58 |
| Main Header | 3.4 | 27.6 | 32.2 | 0.5 | 0.9 | 0.6 | 0.98 | 0.89 | 0.87 | 111.7 | 120.1 | 163.3 | 45 | 87 | 74 |
| TA-13 | | 54.7 | 60.8 | | 2.3 | 6.2 | | 0.78 | 0.72 | | 12.4 | 16.8 | | 22 | 80 |
| Main Header | | 28.3 | 31.8 | | 0.9 | 0.8 | | 0.89 | 0.87 | | 122.1 | 163.3 | | 88 | 105 |
| VR-2s | 2.7 | | | 0.6 | | | 0.99 | | | 7.0 | | | 3 | | |
| Main Header | 3.0 | | | 0.8 | | | 0.98 | | | 112.1 | | | 69 | | |
| VR-2d | | 54.9 | 68.7 | | 20.7 | 32.0 | | 0.63 | 0.47 | | 10.1 | 10.5 | | 161 | 259 |
| Main Header | | 29.4 | 31.9 | | 1.3 | 0.8 | | 0.88 | 0.87 | | 118.4 | 165.1 | | 120 | 96 |

The calculated flowrates reflect the desire to extract approximately 10 scfm from each well (where possible) for a total combined flowrate of approximately 160 scfm. In general, the combined main header flowrate increased during heating. This rise is most likely due to the increased moisture content with time. Similar to the moisture content, the calculated flowrates in the main combined header did not vary much between measurements taken during the same testing event.

During the baseline testing, the helium tracer recoveries calculated for each of the individual vapor recovery wells ranged from 3% to 37%. Although these values are relatively low, the recovery from the entire network of wells ranged from 45% to 92%. These results would imply that the vapors that escape the nearest well's influence are still captured, to some degree, by the overall network. Helium tracer recoveries calculated for Week 4 increased over the baseline values at individual wells, as well as the overall combined header. The increased capture efficiency could be due to increased radius of influence as well as increased vapor phase porosity as the water table was depressed. Relatively high measured helium concentrations from VR-2d, along with uncertainty in the measurements and calculations, resulted in helium tracer recoveries greater than 100%. Although a recovery of greater than 100% does not make physical sense, the qualitative assessment is that vapor recovery at VR-2d is very good. Helium tracer recoveries calculated for Week 9 increased over Week 4 readings at each of the individual wells and for the main combined header measured with TA-13. Even though the calculated main combined header recoveries measured with VR-3d and VR-2d during Week 9 decreased from values calculated for Week 4, the recoveries are still relatively high.

Conclusions and Recommendations

URS Radian optimized the vapor recovery network and performed a helium tracer recovery test at three pairs of locations before heating (baseline), during Week 4, and during Week 9. Based upon the results, a few conclusions can be made:

- Moisture content in the extracted gas increased from approximately 3% to 32% overall. The measured moisture contents are consistent with condensate production rates;
- Measured helium concentrations (and calculated tracer recoveries) at VR-2d were relatively high compared with other concentrations and recoveries. These values may reflect accumulation of helium from previous test runs;
- Calculated flowrates from the combined main header increased as heating progressed. The increase in flow is probably due to increased moisture content; and
- In general, calculated helium tracer recoveries increased as heating progressed. Although there is considerable uncertainty involved in the measurements and calculations used to derive the recovery values, it appears that the vapor recovery network is doing an adequate job of capturing vapors generated within the treatment array.

Recommendations for future vapor recovery network design and operation include:

- Operate the SVE blowers at the highest vacuum possible. This will allow approximately 10 scfm to be extracted from each of the wells; and
- Install or use existing vapor recovery wells with shallow (4 to 9 feet bgl), deep (12 to 17 feet bgl), and Terrace Alluvium (8 to 32 feet bgl) screened intervals to capture vapors in the areal and vertical extent of the treatment array.

**Response to Comments to the
Six-Phase HeatingTM Pilot-Scale Test
Draft Technology Performance Report
Dense Non-Aqueous Phase Liquid
Eastern Parking Lot Groundwater Plume
Air Force Plant 4
Fort Worth, Texas, February 2001**

General Comments: The stated purpose of this pilot-scale test was to determine the effectiveness of Six-Phase HeatingTM (SPH) technology at removing trichloroethylene (TCE), including dense non-aqueous phase liquid (DNAPL), at the Air Force Plant 4 (AFP4). Three specific performance criteria with corresponding objectives were defined for the test. The SPH test results exceeded all three objectives. Two of the objectives were remediation levels for TCE in soil and groundwater. The SPH test system heated the soil to levels that exceeded the boiling point for TCE and effected removal through an existing Soil Vapor Extraction (SVE) system at AFP4. The contaminated site is on the National Priorities List and a negotiated Record of Decision stipulates that TCE in soil (in the vadose zone) must be reduced to below 11.5 milligrams/kilogram (mg/kg) and that TCE levels in the underlying groundwater not exceed 10 milligrams/Liter (mg/L). Results of the pre- and post-test sampling indicated that TCE levels were reduced to 0.29 mg/kg in soil and 5.7 mg/L in groundwater, all 95% Upper Confidence Level values. These removal values represent a 97% and 95% reduction of TCE levels in soil and groundwater respectively. Also, the SPH system appeared to enhance the natural biodegradation of TCE by organic carbon sources in soil. From the test data review, SPH appears is a technologically effective method of gross TCE removal; however, cost of treatment was about \$1500 per pound of contaminant removed or about \$1.30 per cubic yard of soil treated (these costs did not include the cost of running the SVE system). TCE removal efficiency tailed off considerably toward the end of the 88-day test and this leaves some question as to the economic viability of using SPH to achieve microgram levels of TCE in either soil or groundwater. Based on the test results, SPH is a technically acceptable method of TCE at AFP4, costs not withstanding.

Results of the calibration and quality control parameters for the project were not included in the document. Only data summary Tables were included. The quality of the data could not be evaluated independently. Section 3.4 of the document discusses quality problems encountered in the analytical process. The concerns discussed in this section should not have an impact on the overall quality of the data. Specific comments are provided regarding qualifying results as appropriate.

Many of the analytical results for trichloroethylene TCE were high, beyond the calibration range requiring dilution of the samples. Dilution factors for samples should be included in the summary tables. The laboratory audit report (Appendix E) recommends that the software used to calculate dilute concentrations be verified to ensure that the calculations are accurate. The Quality Assurance (QA) summary section should assure that verification has been done and that the sampling results for TCE have been validated.

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Response to the General Comment:

Dilution factors for samples are included in the report summary tables. The laboratory hand validated a subset of the dilutions and verified the calculations. The results for TCE have been validated by the URS project QA/QC Coordinator.

Specific Comments:

| Item | Section | Page | Para | Line | | Comments |
|--------------------------|---------|------|------|------|---|--|
| From Informatics: | | | | | | |
| 1 | 1.2 | 1-4 | 3 | 4 | Was the DNAPL not found down gradient “in” or “from” the Eastern Parking Lot? Check to ensure that “in” is correct. | The text remains on Page 1-4, paragraph 3, line 4. “In” is correct. This refers to the initial partitioning tracer tests. The test within Building 181 and the test just northeast of Building 182 (in the EPL area) determined that DNAPL was present. The far downgradient test, also performed in the EPL, determined that DNAPL was not present. |
| 2 | 2.0 | - | - | - | Pages 2-4, 2-8, 2-12, 2-14, and 2-16 are missing. The back sides of some full page figures are not numbered. Correct this discrepancy so that the reader will not be left to wonder if pages are missing. | The document has been reformatted to eliminate the blank pages (i.e., “This Page Intentionally Left Blank” has been inserted on the back of color foldout figures). |

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| 3 | 3.1 Figure 3-1 | 3-1 3-2 | 5 - | - - | SPH effectiveness is based on pre- and post-test sampling results; however, pre-test soil sampling occurred on or about 30 April and the SPH didn't begin operation until 7 August. TCE levels may or may not have been significantly reduced in that three-month timeframe. Address this issue in the text on page 3-1. | Ideally, the pre-test sampling would have occurred immediately prior to the SPH operation phase. Due to logistical difficulties, there was a lag period of approximately three months. However, the results of the pre-test sampling were consistent with historical analytical data. Since the contamination has remained at the site for a period of years, it is not expected that TCE levels would appreciable change in a period of months. This has been addressed on page 3-1, paragraph 3, line 2. |
| 4 | 3.4 | 3-7 | 4 | 1-3 | All results that are reported over the calibration range should be flagged appropriately. | This comment has been addressed on page 3-7 and in Appendix D. The parent sample discussed was diluted and reported within the calibration range. In general, flags have been added to the analytical data tables in the appendix. These flags have been carried forward from the appendix to the data summary tables included in the text. |
| 5 | 3.4 | 3-7 | 5 | 1 | Water sample results for AFP4-SPH-GW11-6 were not included in the summary Tables; however, results for AFP4-SPH-GW11-0 were reported. Resolve the discrepancy. Values that are known to be biased low should be appropriately flagged. | The summary table still includes the data for the normal sample AFP4-SPH-GW11-0. The sample AFP4-SPH-GW11-6 was actually the trip blank for the parent sample. All appropriate flags are included in the summary tables and in the Appendix D tables. |
| 6 | 3.4 | 3-8 | 1 | 1-3 | If benzene and styrene are not chemicals of concern for this project, a note of explanation should be added. | This has been explained on Page 3-8, second paragraph, third line. |

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| 7 | 3.4 | 3-8 | 3 | 10-12 | The results of sample AFP4-SPH-S032-0 in the summary Table are not flagged as the text indicates. | In Table 4-3, the sample has been appropriately flagged as "estimated." |
| 8 | 4.0 | - | - | - | Pages 4-8, 4-12, 4-16, and 4-20 are missing. The back sides of some full page figures are not numbered. Correct this discrepancy so that the reader will not be left to wonder if pages are missing. | See response to Informatics Comment #2. |
| 9 | 4.1.1 | 4-1 | 5 | 2 | Add an "s" to "location." | An "s" has been added to "location" on page 4-1, last paragraph, line 2. |
| 10 | 4.1.1 | 4-1 | 5 | 5 | It appears that "from" should be changed to "at." If this is correct, make the change or clarify this sentence. | "From" has been changes to "at" in the second to last sentence on page 4-1. |
| 11 | 6.1 | 6-2 | 2 | - | Include a statement that these are incomplete costs since the cost of operating the SVE and the contaminant recovery system is not included. | A statement has been included to point out that the unit costs do not include the costs for SVE. |
| From AFCEE/ERC: General Comments | | | | | | |
| 1 | <u>Design to Heat total source area all at same time or from perimeter to center.</u> Lack of CSM information leaves open the probability of moving contamination instead of removing it. | | | | This test was performed to determine the effectiveness of SPH in one of the most contaminated areas. Although boundary effects cannot be discounted, there is not a driving force for moving contamination out of the area, other than natural groundwater hydraulic effects. | |

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| 2 | <u>Revisit all possible source areas (i.e. tanks, pits, transmission lines).</u> Are all sources in the proposed full-scale SPH area covered? Is there a list of sources for the CSM that have contributed to the plume? It appears there may be some unknowns that have to be addressed on the north side. | The known primary sources of TCE contamination are former Tanks T-534 and T-544 and the associated process area, as now indicated on Figure 1-2. The expanded SPH area will encompass this area, as well as the area of soil contamination greater than 11.5 mg/kg. Although this boundary has not been completely defined on the north side, the soil vapor results from this area do not indicate an additional, unknown source. | |
| 3 | <u>Revisit the CSM on the 5-10' Saturated Zone in light of exposed lithology along Meandering Road Creek.</u> Examine lithologic logs and compare with outcrop for correct placement of electrodes in subsurface. A quick study of the outcrop should help give those we must convince a greater confidence in the CSM. | URS staff examined the referenced outcrop. A study is underway to assess whether contamination (DNAPL) is present in the upper portions of the bedrock beneath the study area. | |
| From ASC/ENVR: | | | |
| 1 | Fig 1-2 | We should certainly be able to include, on this figure, the location of the (1992) leaking tank, T544 - I've seen it on other drawings. But we know it is within the contour proposed/planned to be addressed in further projects. | The tanks have been included on Figure 1-2 and are within the contour of the area of known soil contamination. |
| 2 | RPO input | I concur with EarthTech in that the CatOx unit currently in operation is likely too expensive. We should consider re-installing carbon filters both as a backup/peaking capability for future treatment operations and to cut costs in the interim (task for IT). | Comment noted. |

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| 3 | RPO input | It seems that the soils portion has <i>relatively</i> little contamination left. Some areas may still be highly contaminated from the route the initial spill took while migrating downward. Given the risks associated with LM Areo utilities, the recommendation that heating could/should be used in the first few feet bgs should be implemented only in areas where contamination, but no piping, exists. I sent Steve Fain a Powerpoint slide with our map of utilities, not OK for drilling, but should be fine for performance-based design. | The diagram will be reviewed and this information will be considered during electrode placement and target depths. |
| 4 | LF3 RI concerns | The likelihood that fractured rock (weathered limestone) exists in the area should be evaluated (task for IT). This will enable better understanding of the practicality of using controlled DNAPL recovery (cheaper) and/or SPH for similar sites, or further at this site. URS/TRS should also consider installing any planned g/w P&T wells (and/or electrodes) down into the rock a few feet, as indicated by local corings. | Comment noted. The results from the bedrock investigation will be utilized in determining the target depths for electrodes. It is also important to note that although the pilot-test electrodes were installed at the alluvium/bedrock interface, heating extended several feet down into the bedrock. |
| 5 | Implementation area | I agree that we must treat the RA soils area from the outside in, to eliminate residual concerns about rebound. Further characterization in Bldg. 5 should be limited to that needed to define the northern extent, and be useful for subsequent installation of electrodes, SVE wells or external monitoring points. Heating to the south and west (at depth) may yet cause increased g/w contamination, since DNAPL is likely from the site westward all through bldg 181/182 (see next two comments). | Comment noted. The variations in TCE concentrations in groundwater from MW-5 are well within historical trends. |

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| 6 | TIO concerns | The existing g/w RA contour was established 2+ years ago. Monitoring wells should be re-sampled to obtain a more current baseline before large-scale heating is implemented (task for Jacobs), and again afterward (next year). Given the April sampling round is fast approaching, we should look into having a more thorough sampling of wells in the Bldg. 181/182 area, possibly quarterly. | Comment noted. |
| 7 | FFS / Jacobs LTM data | Jacobs did sample MW-5 (and others, April & October each year) which shows high levels of TCE concentration. In April 2000, 550ppm, field Temp was 24.9 °C; in October, 820ppm, field temp was 25.8 °C. I suspect that this is not sufficient information to draw conclusions from. My concern is that the thermodynamics of g/w have increased the rate of dissolution of DNAPL across a broad area. This may well affect the northern and eastern edges of the implementation area in g/w. More effective dual-phase g/w pumping should be engaged in the area (task for IT) as well as during implementation. | Comment noted. |

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